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THE SCOTTISH GEOGRAPHICAL MAGAZINE

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THE SCOTTISH GEOGRAPHICAL MAGAZINE

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PROFESSOR JAMES GEIKIE, LL.D., D.C.L., F.R.S., HON. EDITOR
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Branches of the Society have been established in Glasgow, Dundee, and Aberdeen, where periodical Meetings are held.

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THE SCOTTISH GEOGRAPHICAL MAGAZINE.

THE NORWEGIAN SOUTH POLAR EXPEDITION.[1]

By Captain ROALD AMUNDSEN,
Livingstone Medallist of the Royal Scottish Geographical Society.

(With Map and Illustrations.)

WHILE the struggle for the North Pole covers hundreds of years, the struggle for the South Pole is of comparatively recent date. About 1900 we find several expeditions—English, German, French, Belgian, Scottish, and Swedish—working hand-in-hand in order to withdraw the veil and lay open the great mysteries of the Antarctic. The object of several of these expeditions was of course scientific, but I believe I may say that the Pole itself loomed behind as the ultimate goal.

My time to-night does not permit me to review all the expeditions that have contributed to increase our knowledge of the great unexplored section of the Antarctic continent. I shall mention only those which did work earlier in the region where we had to look for our starting-point. Our object being to reach the South Pole, we had first of all to push forward with the ship as far south as possible and there build our station. The sledge journey would be long enough, anyway. I knew that the English would go to their old winter quarters in M'Murdo Sound, South Victoria Land. The newspapers had stated that the Japanese had reserved King Edward VII. Land. Thus there was nothing else for us to do but to build our hut on the barrier itself, as far from these two expeditions as possible, in order not to be in their way.

The great Antarctic barrier, or the Ross Barrier as it is called, between South Victoria and King Edward VII. Land, has an extent of about 450 geographical miles. The first who met with this enormous glacial

[1] An address delivered before the Society in Edinburgh on Nov. 21, 1912.

formation was Sir James Clark Ross in 1841. He, naturally enough, did not take the risk of running his two sailing vessels, the *Erebus* and *Terror*, close under the mighty 100-feet high ice-wall, which barred his progress towards the south. But he examined it at a reasonable distance as well as circumstances would permit. These observations made it clear that the barrier was not a straight, steep ice-wall, but was broken at intervals by bights and small inlets. In Ross's chart we notice an imposing bay-formation in 164° W. and 78° 30′ S. The next expedition that sailed down to these regions was the Southern Cross expedition in 1900. It is interesting that this expedition found this bay in the same place where Ross saw it in 1841—sixty years earlier. As interesting is it, that this expedition succeeded in landing in a little bay—Balloon Bight—some miles to the eastward of the big one, and from there climbed up on the barrier, which up to this time had been considered inaccessible and an invincible hindrance to an advance towards the south.

In 1901 the *Discovery* steamed along the barrier and confirmed in every respect the observations of the Southern Cross expedition. It also succeeded in discovering land in the direction mentioned by Ross—King Edward VII. Land. Scott also landed in Balloon Bight and observed, like his predecessors, the big bay formation to the west.

In 1908 Shackleton in the *Nimrod*, like his predecessors, followed the barrier, and arrived at the conclusion that disturbances in the barrier had broken away the shore-line of Balloon Bight, merging that indentation into the bay to the west. To the big newly formed bay he gave the name of the "Bay of Whales." But his original plan of landing here was abandoned—the barrier in this place looking too dangerous as a foundation for winter quarters.

When the two charts were compared, it was not difficult to decide that the bay put down on the chart by Ross and the Bay of Whales was one and the same. Though some few pieces had broken off here and there, this bay had remained constant for about seventy years. It was an obvious conclusion that the bay was no casual formation, but owed its existence to subjacent land, banks, etc. This bay we selected as our basis of operation. It is 350 nautical miles (650 kiloms.) from the English station in M'Murdo Sound, and 100 nautical miles (185 kiloms.) from King Edward VII. Land. It seemed to us therefore that we were at a sufficient distance from the English sphere, and need not fear that we should come in their way. The reports in regard to the Japanese on King Edward Land were rather vague, and we thought that a distance of 100 miles from them was more than enough.

On board of Nansen's well-known polar ship, the *Fram*, we left Norway on August 9, 1910. We carried on board ninety-seven fine Eskimo dogs from Greenland, and provisions for two years. The first port we touched was Madeira, where we finally made everything ready for the long voyage to the Ross Barrier. It was no short distance we had to cover—about 16,000 nautical miles (29,600 kiloms.)—from Norway to the Bay of Whales. We had calculated that it would take us five months to make the trip. The *Fram*, which with good reason is said to be the most solid polar ship in the world, proved to be

The *Fram* in the Bay of Whales.

To face page 3.]

(From *The South Pole*.

exceedingly seaworthy during this long voyage over pretty nearly all the oceans. Thus we sailed through the north-east and south-east trades, the roaring forties, the foggy fifties and the icy sixties without any mishap, and arrived at our sphere of work at the barrier on January 14, 1911. Everything had gone unusually well.

The ice in the Bay of Whales had just broken up, and to such an extent that we succeeded in sailing quite a distance further south than any of our predecessors, and found a cosy little corner behind a projecting ice cape, from which we could, in comparative safety, bring our outfit up to the barrier. Another great advantage was that the barrier here sloped very gently down to the sea ice, and this gave us good ground for sledging. The first thing we did on our arrival was to climb the barrier to examine the nearest surroundings and to find a convenient place for the house we had brought from home. The supposition that this part of the barrier rested on subjacent land seemed to be confirmed at once by the surroundings. Instead of the plain, smooth surface that the outer barrier wall shows, we found the surface here greatly disturbed. Steep hills and crests, with intervening dales, filled with huge hummocks and pressure ridges, were seen everywhere. And these formations were not of recent date. It was easy to notice that they dated from a time far beyond the days of old father Ross. Our original plan was to build our station several miles from the barrier edge in order to guard us against an unwished-for sea trip, in case the part of the barrier on which our house was built, should break off. But that was not necessary. The formations we met on our first examination were warrant enough for the barrier's stability in this region. In a little valley 2 nautical miles (3½ kiloms.) from the spot where we had made fast the ship, well sheltered against all winds, we selected a place for our winter quarters. On the following day we commenced to discharge the ship: —materials for housebuilding, outfit and provisions for nine men for several years. We were divided into two parties, the ship and the shore party. The first consisted of the master of the ship, Captain Nilsen, and nine men who would stay on board to navigate the *Fram* out of the ice and up to Buenos Aires. The other party consisted of those of us who were to go into winter quarters and march towards the south. It was the duty of the ship's party to unload everything from the ship on to the ice. There the shore party took it and drove it to the spot we had selected for our house. In the beginning we were a little unaccustomed to this work, untrained as we were after the long voyage. But it didn't take long before all of us were well trained, and then everything went along at a dizzy speed between the ship and our future home, Framheim, which daily increased in size. As soon as all the materials for the hut had been driven up, our experienced carpenters, Olav Bjaaland and Jörgen Stubberud, commenced to erect the house. It was a ready-built house, and now there was nothing to do but to put together the different parts, all of which were marked. That the house might be able to withstand all the storms we expected, the site was excavated to a depth of 4 feet below the barrier surface.

On January 28, fourteen days after our arrival, the home was ready and the provisions ashore. A gigantic piece of work had been done and everything promised well for the future. But time was precious, and it was our duty to make the most of it. The shore party was again divided into two. One would go on driving up from the ship the rest of the stores, outfit, and the like, while the other would prepare for a trip southward for the purpose of exploring our immediate surroundings and establishing a depôt. On February 10, the last named party was off. We were four men, eighteen dogs and three sledges fully laden with provisions. How well I remember that morning when we for the first time made our way towards the south! It was calm and slightly overcast. Ahead of us was the vast, endless snow-plain; behind us the Bay of Whales with the great prominent ice capes, and at the further end of the bay our dear *Fram*. The flag was hoisted, a last farewell from our comrades on board. Nobody knew when we should see them again. Most likely they would be gone when we returned, and then a year would elapse before we should see them. Another look behind, another farewell, and then southward. This first trip of ours on the barrier was an exciting one. What would the region be like? How about the sledging? Had we the proper outfit? Had we the right traction power? If our task was to be accomplished, everything had to be of the best. Our equipment was essentially different from that of our English competitors. We pinned all our faith to our dogs and ski.

We travelled fast on the smooth, flat snow-plain. On the 14th we reached 80° S., having travelled a distance of 85 nautical miles (160 kiloms.) and established a depôt, consisting chiefly of provisions to be used on our main march towards the south when spring came. The weight of the provisions was 1600 lbs. The return trip was made in two days. The first day we travelled 46 nautical miles (75 kiloms.), and the second day 50 nautical miles (93 kiloms.). On our arrival at the station, the *Fram* had sailed. The bay looked dreary and desolate. Seals and penguins had taken possession of the place. Our first trip southward, however short, was of great importance. We now knew to a certainty that our equipment and traction power was of the very best. No errors had been made in the selection of it. Now it was for us to use them in the best manner possible.

We did not stay long at home. On the 22nd we were once more ready to carry our depôts towards the south. The intention was to take them as far south as possible. We were eight men, seven sledges, and forty-two dogs. The cook alone stayed at home. On the 27th we passed the depôt in 80° S., where everything was in first-class order. On March 4, we made lat. 81° S., and deposited there 1050 lbs. of provisions. From here three men returned, while five men continued their way southward, and on March 8 reached 82° S., where 1250 lbs. of provisions were left. We then returned, and were home again on the 22nd. Once more before the winter set in we were in the field, and carried 2200 lbs. of fresh seal meat and 400 lbs. of other provisions to the depôt in 80° S. On April 11 the trip was completed, and all the

depôt work had come to an end. Up to this time we had carried 6500 lbs. of provisions, distributing them at the three depôts.

The part of the barrier over which we had travelled had an average height of about 150 feet, and looked like a smooth plain, rising in great waves or undulations without characteristic marks of any kind. It has been the common opinion that depôts could not be laid out on such an endless plateau without an imminent probability of losing them. But if there was to be any chance of reaching our goal, we had to lay out our depôts, and that even on a large scale. We talked much over the question, and arrived at the conclusion that we must use signals athwart our course instead of along it as is commonly the case. Consequently, we put down a line of flags at right angles to our course, that is, in an east west direction, with the depôt as central point. Each of the three depôts was marked in this manner, 5 nautical miles (9 kiloms.) on each side of the depôt, with half a mile (1 kilom.) between each flag. Besides, all the flags were marked, so that, wherever we met them, we were able to discover in which direction the depôt lay, and how far we were from it. This plan proved to be absolutely reliable, and even in the densest fog we succeeded in finding our depôts. Our compasses and distance meters were examined at the station, and we knew that we could depend upon them.

We had gained much on our depôt trips. Not only had we succeeded in carrying plenty of provisions southward, but we had acquired a lot of experience, which was possibly more important, and came in handy on our final dash for the Pole. The lowest temperature observed on these depôt trips was −50° Fahr. Considering that it was still summer when this temperature was observed, it was a serious warning to us that we must have our equipment in good order. We had also seen that our solid, heavy sledges were too clumsy, and that without risk they could be lightened considerably. The same could be done with the greater part of our other outfit.

Some days more were spent on a seal hunt, before the sun disappeared. The total weight of the seals killed amounted to 120,000 lbs. Thus we had provisions in plenty for ourselves as well as for our dogs, now increased to 115. The first thing we did was to make them a shelter. We had brought with us ten very big tents, large enough to accommodate sixteen men. They were pitched on the barrier, after which the snow under each tent was dug out, 6 feet down, so that the ultimate height of these dog-houses became 18 feet. The diameter of the floor was 15 feet. Our intention in building these houses so large was to make them as airy as possible, in order to avoid the hoar frost so annoying to the dogs. We achieved our object, for even during the most severe period of the winter no frost could be noticed. The tents were always cosy and warm. Each tent had room for twelve dogs, and every man had his own team to look after.

Having thus cared for our dogs, our own turn came. Mother nature had stretched out a helping hand, and we were not slow in taking it. By April the house was completely covered with snow. In this newly drifted snow excavations were made in direct communication

with the hut. Thus we got large and spacious rooms without buying or fetching materials. There were workshops, forge, sewing-room, packing-room, a space for coal, wood and oil, ordinary bath and steam bath. However cold and stormy the winter might be, it would not annoy us at all.

On April 21 the sun disappeared, and then began the longest night ever experienced by men in the Antarctic. We had no fear of meeting it. We had provisions enough for years, a cosy house well ventilated, well lighted, and well heated, with an excellent bath—a complete sanatorium indeed. As soon as all these buildings were finished we began to make preparations for the final journey in the spring. Our business was to improve our equipment and reduce its weight. Thus we condemned all our sledges. They were too heavy and clumsy for the smooth surface of the barrier. The weight of such a sledge was 150 lbs. Our ski and sledgemaker, Bjaaland, took care of the sledges and did all the necessary work connected with them, and when the spring came, a complete new sledge outfit was ready from his hand. These sledges weighed only one-third of the original ones. In a like proportion we succeeded in reducing the weight of everything. Of the utmost importance was the packing of the provisions selected for the trip. It was the work of Captain Johansen during the winter, and had to be done with care and attention. Of the 42,000 biscuits that were packed, each and every one was turned in the hand, before the right place for it was found. In this manner the winter passed quickly and comfortably. Every one had his hands full all the time; our house was warm and dry, light and airy; consequently the health of everybody was excellent. We had no physician, and we didn't need one.

Meteorological observations were taken all the time; the results were surprising. We believed that we should encounter unpleasant, stormy weather, but it proved to be contrary to expectations. During the whole year we stayed there we didn't have more than two moderate storms; for the rest calm and light breezes—mostly easterly. The atmospherical pressure was mostly very low, but steady. The temperature became very low, and it is probable that the mean temperature for the year, $-14°{\cdot}8$ Fahr. ($-26°$ C.), which we observed, is the lowest mean temperature on record. In five months of the year we had temperatures below $-58°$ Fahr. ($-50°$ C.). On August 13, we had the lowest temperature observed, $-74°{\cdot}2$ Fahr. ($-59°$ C.). The aurora australis was very frequent in all directions and shapes; it was extremely lively, but not very intense. There were, however, a few exceptions.

On August 24 the sun returned; the winter was over. Some days before we had all our things in full order, and when the sun peeped over the barrier everything was ready for a start. The dogs were in excellent condition, some of them too much so. From now on we watched the temperature daily. As long as the glass remained as low as $-58°$ Fahr. (-50 C.), there could be no question of starting. In the first days of September there was every sign that it was going to rise, and we therefore resolved to push off as soon as possible. On Sep-

tember 8 we had a temperature of −31 Fahr., and off we were. But this trip was not to be one of long duration. On the following day the temperature began to go down rapidly, and within a few days we had −72°·4 Fahr. (−58 C.). We human beings might have kept going for some time in this temperature, well clothed as we were, but our dogs could not stand it very long. We were therefore satisfied to reach 80° S., and arriving there we laid all our provisions and outfit in the old depôt and returned to Framheim.

Now came a period of doubtful weather, the change from winter into spring, and we never knew what the next day would bring forth. Some frost-bitten heels from the last trip forced us to wait until we knew for certain that the spring had come in earnest. On September 24 the first obvious sign of spring appeared—the seals began to go up on the ice. This sign, and not least the fresh seal meat which Bjaaland brought that very day, was welcomed with rejoicing. The dogs also appreciated this sign of spring. They were especially fond of fresh blubber. On the 29th appeared another and more obvious sign—a flight of Antarctic petrels; they were flying round the house, to the delight of the men as well as of the dogs. The dogs were wild with joy and excitement, ran after the birds and stupidly counted on a delicate bird for dinner: the hunt resulted in a wild fight. At last on October 20 the weather had settled so much that we were able to start. The original plan, that all of us should march southward, had been changed during the interval. We understood that without risk we could divide into two parties, and in this manner do considerably more work. We had arrived at the decision that three men should go east to King Edward VII. Land and examine it, while the other five should carry out the main plan—the dash for the Pole.

October 20 was a fine day, clear and mild; temperature −1° Fahr. We were five men, fifty-two dogs, and four sledges. Our sledges were light, and the going was lively. It was not necessary to encourage the dogs, they were willing enough without. With our depôts in 80°, 81° and 82°, we had provisions enough for 120 days. Two days after our departure a serious accident nearly happened, Bjaaland's sledge falling down one of the many crevasses we had to pass over that day. He got assistance at the last moment, but it was in the nick of time, or his sledge with the thirteen dogs would have disappeared in the apparently bottomless pit.

On the fourth day we arrived at our depôt in 80° S. Here we rested two days and gave our dogs as much fresh seal meat as they could eat. Between 80° and 81°, in the direction we went, the barrier is smooth and level with the exception of a few low undulations, and there are no hidden dangers. It is quite different between 81° and 82°. During the first 15 miles we were in a perfect labyrinth of crevasses and pressure ridges, rendering the passage extremely dangerous. Big pieces of the surface have been broken off, and gaping abysses are met with everywhere. From these gulfs cracks are to be found in all directions, and the surface consequently is very unsafe. We passed this bit of road four times. The three first times it was such a dense fog, that we could not see many yards ahead of us. Only the fourth time

did we get clear weather, and we saw then what difficulties we had escaped. On November 5 we reached the depot in 82° S., and found everything all right. For the last time our dogs could get a good rest and plenty of food. And they got it thoroughly during a two days' stay. In 80 we commenced to build snow mounds, intended to serve as track marks on the homeward trip. We erected one hundred and fifty mounds in all. Sixty snowblocks were needed for a single mound; thus 9000 blocks were cut for these marks. The mounds proved to answer expectations, as by them we returned by precisely the same route we had gone.

The barrier south of 82° was, if possible, still more smooth than to the north of that latitude, and we marched along at a good speed. We agreed to lay down a depôt at each whole degree of latitude on our way south. Undeniably we ran a risk in doing so, as there was no time for putting down cross-marks. But we had to be satisfied with the snow mounds and pin our faith to them. And, on the other hand, our sledges became so much lighter that they were never too heavy for our dogs. In 83° S. we sighted land in a south-westerly direction. It could be nothing else but South Victoria Land, and probably a continuation of the mountain range running in a south-easterly direction, as drawn by Shackleton in his chart. From day to day the land became more distinct, each peak being more magnificent than the next; they are from 10,000 to 15,000 feet in height, sharp cones and sharp needle-like spurs. I have never seen a landscape more beautiful, more wild, and more imposing. Here a weathered summit—dark and cold—there snow and ice glaciers pell-mell in terrible chaos. On November 11 we sighted land due south, and pretty soon ascertained that South Victoria Land in about 86° S. and 163° W. is met by a range trending east and north-east. This mountain range is considerably lower than South Victoria Land's mighty mountains. Summits from 2000 to 4000 feet were the highest. We were able to see the range to 84° S., where it disappeared on the horizon. On the 17th we arrived at the spot where the ice barrier and the land are joined. We had all the time been steering due south from our winter quarters. The latitude was 85°, and the longitude 165° W. The junction between barrier and land was not followed by any great disturbances, but only by a few large undulations broken off at intervals by crevasses. Nothing there could impede our progress. Our plan was to go due south from Framheim to the Pole, and not go out of the way unless natural obstacles should force us to do so. If we succeeded, we would thus be able to explore an absolutely unknown land, and do good geographical work.

The nearest ascent due south was between the mighty peaks of South Victoria Land. Obviously there were no serious difficulties in store for us. We might probably have found a less steep ascent if we had crossed over to the newly discovered range. But we had once taken the notion that due south was the shortest way to the goal, and then we had to take the chances. On this spot we established our main depôt and left provisions here for thirty days. On our four sledges we carried provisions for sixty days. And up we went for the plateau. The first part

Captain Amundsen in Polar dress.

To face page 8.] (From *The South Pole*.)

of the ascent was over sloping, snow-covered mountain sides, in some places rather steep, although not bad enough to prevent each team managing to haul up its own sledge. Further up we met with some short but very steep glaciers, in fact, they were so steep that we had to harness twenty dogs to each sledge. But now they went briskly enough in spite of precipices which were so steep that we had the greatest difficulty in climbing them on our skis. The first night we pitched camp at a height of 2000 feet. The second day we climbed mostly up some small glaciers, and camped at a height of 4000 feet. The third day we unfortunately had to swallow a bitter pill and descend about 2000 feet, being surprised by a large glacier running east-west, which divided the mountains we had climbed from the higher peaks further south. Down hill the expedition went therefore at a dizzy speed, and in a very little time we were down on the before-mentioned mighty glacier, Axel Heiberg's Glacier. That night our camp was about 3000 feet above sea-level. The following day began the longest part of our climb, as we were obliged to follow Heiberg's Glacier. This glacier was in places filled with hummocky ice, the surface rising into hillocks and splitting into chasms, and we had to make detours in order to escape the broad chasms which open into great gullies. The latter were of course mostly filled, the glacier apparently having stopped every movement long ago. But we had to be very careful, not knowing how thick was the covering layer. Our camp that night lay in very picturesque surroundings, in an altitude of 5000 feet above sea-level. The glacier here was compressed between two 15,000-feet high mountains—Fridtjof Nansen and Don Pedro Christophersen mountains. To the west at the further end of the glacier rose Mount Ole Engelstad to a height of 13,000 feet. The glacier in this comparatively narrow passage was very hummocky and broken by huge crevasses, so that our progress very often seemed to be impeded. On the following day we reached a slightly sloping plateau, which was supposed to be the plateau described by Shackleton. Our dogs worked so well that day that their superiority must be admitted once for all. Added to the toil of the preceding weary days, they travelled this day 17 nautical miles (33 kiloms.), ascending 5600 feet. We camped that night in an altitude of 10,600 feet. Now the time had come when, unfortunately, we were obliged to kill some of our dogs. Twenty-four of our brave companions had to lay down their lives. We had to remain here for four days on account of bad weather. When we at last broke up camp on November 26, we had only ten carcasses left, and these we laid in depôt. Some fresh provisions on our return trip would not do any harm. During the following days the weather was stormy and the snowdrift dense, so we were not able to see any of the surroundings. But we did notice that we were going down hill very fast. Once in a while when the drift lifted we saw high mountains due east. In a dense snowdrift on November 28 we were close under two peculiar-looking crests of mountains, running north-south, the only two peaks we observed on our right side. These we called Helland Hansen's Mountains: they were wholly snow-clad and had a height of 9000 feet. They became later on an excellent landmark. The gale slackened the next day and the sun shone

through. Then it appeared to us as if we were transported to an absolutely new country. In the direction of our course trended a huge glacier. On its eastern boundary was a range running south-east—north-west. To the west the fog was dense over the glacier and hid even the nearest surroundings. The hypsometer gave 8000 feet above sea-level at the foot of "The Devil's Glacier," which means that we had descended 2600 feet from the Butchery. It was no pleasant discovery. Without doubt we would have the same climb again and probably more. We established a six-days' depôt and continued our march. From our camp that night we had a splendid view of the eastern mountain range. There was the most peculiar-looking peak I have seen. It was 12,000 feet high, and the top was round in shape and covered by a torn glacier. It looked as if nature in a fit of anger had showered sharp ice blocks down on it. We called it Helmer Hanssen Mountain, and it became our best landmark. And there were Oscar Wisting, Olav Bjaaland, Sverre Hassel mountains, glittering dark and red, glaring white and blue in the rays of the midnight sun. In the distance appeared a romantic mountain—enormous to behold through the heavy masses of clouds and fog, which from time to time drifted over, now and then exposing to our view its mighty peaks and broken glaciers. Thus appeared Thv. Nilsen Mountain for the first time. The height of it was 15,000 feet. It took us three days to climb the Devil's Glacier. On December 1 we had left behind us this crevassed glacier, so full of holes and bottomless chasms. Our altitude was 9100 feet. Ahead of us, and looking like a frozen sea in the fog and snowdrift, was a sloping ice-plateau studded with hummocks. The march over "The Devil's Dancing-room" was not entirely pleasant. Gales from south-east, followed by snowdrift, were of daily occurrence. We saw nothing, absolutely nothing. The ground below us was hollow, and it sounded as if we were walking on the bottom of empty barrels. We crossed this unpleasant and ugly place as quickly and as light of foot as possible, all the time with the unpleasant possibility of being engulfed.

On December 6 we reached our greatest height—10,750 feet above sea-level, according to hypsometer and aneroid. From here the main inland plateau didn't rise any more, but ran into an absolutely flat plain. The height was constant as far as 88° 25′, from where it began to slope down to the other side. In 88° 23′ we had reached Shackleton's furthest south, and camped in 88° 25′. Here we established our last depôt—depôt No. 10, and deposited 200 lbs. of provisions. Then we began to go very slowly down-hill. The state of the ground was excellent, absolutely flat without undulations, hills, or sastrugi. The sledging was ideal, and the weather beautiful. We covered daily 15 nautical miles (30 kiloms.). There was nothing to prevent us from making a good deal longer marches, but we had time and food enough, and considered it more prudent to save the dogs and not overwork them. Without adventures of any kind we made latitude 89° on December 11. It seemed as if we were arrived at a region with perpetually fine weather. The most obvious sign of constant, calm weather was the absolutely plain surface. We were able to thrust a tent-pole 6 feet

down into the snow without being met with any resistance. This is a clear enough proof that the snow has fallen in the same kind of weather—calm or very light breeze. Varying weather conditions—calm and gale—would have formed layers of different compactness, which would soon have been felt when one stuck the pole through the snow.

Dead reckoning and observations had always given like results. The last eight days of our outward march we had sunshine all the time. Every day we stopped at noon to take a meridian latitude, and every evening we took an azimuth observation. On December 13 the latitude gave 89° 37′; dead reckoning 89° 38′. In 88° 25′ we got the last good azimuth observation. Later on they were of no use. As the last observations gave pretty near the same result, the variation being almost constant, we used the observation taken in 88° 25′. We made out that we would reach the goal on December 14. The 14th arrived. I have a feeling that we slept less, breakfasted at a greater speed, and started earlier this morning than the previous days. The day was fine as usual—brilliant sunshine with a very gentle breeze. We made good headway. We didn't talk much. Everybody was occupied with his own thoughts, I think. Or had probably all of us the same thought, which urged all of us to gaze fixedly towards the south over the endless plateau? Were we the first or?—Halt! It sounded like a sound of exultation. The distance was covered. The goal reached. Calm, so calm stretched the mighty plateau before us, unseen and untrod by the foot of man. No sign or mark in any direction. It was undeniably a moment of solemnity when all of us with our hands on the flag-staff planted the colours of our country on the geographical South Pole, on King Haakon the Seventh Plateau.

During the night—according to our time—three men encircled our camp, the length of the semidiameter being 10 nautical miles (18 kiloms.), putting down marks, while the two others remained at the tent, taking hourly observations of the sun. These gave 89° 55′. We might very well have been satisfied with the result, but we had plenty of time and the weather was fine, so why not try to observe the very Pole itself? On the 16th we therefore moved our tent the remaining 5 nautical miles (9 kiloms.) further south, and camped there. We made everything as comfortable and snug as possible in order to take a series of observations throughout the twenty-four hours of the day. The altitudes were observed every hour by four men with sextant and artificial horizon. The observations will be worked out at the Norwegian University. With this camp as a centre we drew a circle with a radius of 4½ nautical miles (8 kiloms.), and marks were put down. From this camp we went out for 4 miles in different directions. A little tent we had carried with us in order to mark the spot was pitched here, and the Norwegian flag with the *Fram* pendant hoisted on the top of the tent. This Norwegian home got the name "Polheim." Judging from the weather conditions, this tent may stay here many years to come. In the tent we left a letter addressed to H.M. King Haakon the Seventh, with information of what we had done. The next man will bring it

home. Besides, we left some clothing, a sextant, an artificial horizon, and a hypsometer.

On December 17 we were ready to start on our return journey. The outward journey had, according to distance meters, covered a distance of 750 nautical miles (1400 kiloms.). The daily average speed had been 13 nautical miles (25 kiloms.). When we left the Pole we had two sledges and seventeen dogs. Now we enjoyed the great triumph of being able to increase our daily rations, unlike earlier expeditions, all of which were obliged to go on short commons—already at a much earlier moment of time. The rations were also increased for the dogs, who got from time to time one of their comrades as an extra. The fresh meat had a favourable effect on the dogs, and contributed no doubt to the good result.

A last look and farewell to Polheim and then off. We see the flag yet. It is still waving to us. It is gradually diminishing. Then it disappears: a last good bye from the little Norway on the South Pole. We left King Haakon's Plateau as we had found it, bathed in sunlight. The mean temperature during our stay here was −13 Fahr. (−25 C.). It felt much milder.

I am not going to weary the audience with a detailed account of the return journey. I shall only mention a few incidents of interest. The beautiful weather we got on our homeward run exposed to our view the whole of the mighty mountain range, that is, the continuation of the two ranges joined in 86° S. The newly discovered range, trending in a south-easterly direction, was everywhere studded with peaks of a height of from 10,000 to 15,000 feet. In 88° S. the range disappears on the horizon. The whole of the newly discovered mountain ranges—about 460 nautical miles (850 kiloms.)—has been given the name "Queen Maud Ranges."

All the depôts—ten in all—were found, and the abundant provisions, of which we at last had plenty, were taken along down to 80°, where they were deposited. From 86° we didn't go on rations, but everybody could eat as much as he liked. On January 25 we arrived at our winter quarters after an absence of ninety-nine days. The distance home, 750 nautical miles (1400 kiloms.), was thus covered in thirty-nine days without a single day of rest. The daily average speed was 19·2 nautical miles (36 kiloms.). On our arrival we had two sledges and eleven dogs safe and sound. Not even for a moment had we helped the dogs to pull the sledges. Our provisions consisted of pemmican, biscuits, milk in powder, and chocolate. Not much of a variation, but a healthy, nutritious food which invigorated the body, just what it needed. The best proof was, that we always felt well, and were never raving about food, which has been so common a feature in all the longer sledge journeys, and is an infallible sign of deficient nourishment.

In the meantime Lieutenant Prestrud and his two companions had succeeded in doing excellent work to the east and in the neighbourhood of the Bay of Whales. They succeeded in reaching King Edward Land—discovered by Scott—and confirm what he had seen. Alexandra

Mountains appeared to be a wholly snow-covered crest—1200 feet high —stretching in a south easterly direction as far as the eye could see, the northern boundary being two bare peaks—Scott's Nunataks—1700 feet high. This expedition's exploration of Framheim's surroundings is of great interest. It appears from their observations that the Bay of Whales is formed by underlying land still snow-covered.

At the same time as our work inshore was going on, Captain Nilsen with his companions on the *Fram* succeeded in doing work which, from a scientific point of view, probably will turn out to be the most valuable of the expedition. On an 8000 nautical miles' cruise from Buenos Aires to Africa and back, they established a series of oceanographic stations, sixty in all. Twice they circumnavigated the world, voyages full of dangers and toil. The voyage out of the ice in the autumn 1911 was of a very serious character. They were ten men all told. Through darkness and fog, cyclones and hurricanes, pack-ice and icebergs, it was their lot to beat their way out. Last but not least let me mention, that the same ten men, on February 15, 1911, hoisted the Norwegian flag further south than a ship has ever floated before.

A fine record in the century of records:—Farthest north, farthest south.

SOME NOTES ON MY 1912 EXPEDITION TO THE SIACHEN, OR ROSE GLACIER, EASTERN KARAKORAM.

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As reported in 1911 in the geographical journals, Dr. W. Hunter Workman and I, after completing our exploration among the Hushe and Kondus systems of glaciers, crossed to the Saltoro valley and traversed the Bilaphon La, 18,900 feet, to the Siachen or Rose glacier on August 19. We examined it for some distance above the entrance of the Bilaphon branch, and visited two of its most important affluents, but it was far too late in the season to contemplate the survey of a glacier the most noteworthy points of which lie at altitudes above 17,000 feet.

The object of my 1912 expedition was to have as detailed a map as possible made of the whole glacier, and to ascend to, and examine myself, its apparently rather complex sources, and elucidate, if possible, the problem of their relations to regions beyond. Mr. C. Grant Peterkin, who had received the diploma of the Royal Geographical Society, and was kindly recommended to me by Mr. E. A. Reeves, F.R.A.S., agreed to act as surveyor. The Surveyor-General of India, Colonel Burrard, R.E., also kindly loaned a native plane tabler, Sarjan Singh, from the Survey to assist in the work. One Italian Alpine porter accompanied the surveyor's party, and four Italian guides and porters, Dr. Hunter Workman and myself.

A Parsee, T. Byramgi, from Srinagar, who had handled the transport

part in 1911, undertook the work this season, and was assisted on the Siachen side by two sepoy reservist orderlies from the Pindi division, Royal Indian Army, who did very good work. Goma, in the Saltoro valley, was the base for supplies.

On reaching the top of the Bilaphon Pass on July 11, the weather being very fine, I decided to attempt an impressive rock and snow peak lying above an elevated snow plateau, north-west, which was likely to command a wide view toward the upper Siachen. We camped on the plateau at 19,000 feet, and the peak was climbed by myself and three guides on the 12th. It proved a difficult mountain, as the last 800 feet lay at a very sharp angle, and each step had to be cut in a surface of black ice.

At the top I found myself separated from the great double-summited K^{10}, 25,415 feet, which heads the Dong Dong glacier, only by the wide snow basin on its north-east side, which we traversed in ascending on that mountain to 20,000 feet last season. Its precipitous walls loomed above us with startling grandeur. North and south the vista of glaciers and peaks, some of which I was able to identify, was grand beyond description. Here I can only say that this ascent, being possible at the beginning of the journey, was of much value in enabling me, as it did, to get a comprehensive idea of the ice region about to be entered. Full light was also thrown upon certain points regarding the Dong Dong and Shorpigang glaciers explored by us in 1911. This peak works out from hypsometric observations available at about 21,000 feet, but heights here mentioned will be subject to change when compared with lower station readings obtained from Skardu.

On reaching the Siachen a sheep and burtsa-camp was set up at our old 1911 base, the Teram Shehr promontory, which abuts on the Siachen at the junction of the large north-east affluent. Sheep were kept here, there being no grass above that point, and burtsa for fuel was collected and sent to higher points. I have named this north-east glacier the Teram Shehr, which is almost the only native name connected with the Siachen of which the oldest inhabitants have a dim remembrance. A flour base-camp, with a baker in charge, was made on moraine a little further up the glacier.

All camps of my own party, except for a few days when we descended the glacier, were at or above 17,000 feet for five weeks, and were mostly either on moraine-covered ice or wholly on snow, for the Rose glacier offers no dainty plots of soil or grass to the tent-nomad visiting its precincts. The mountain flanks on both sides are so precipitous that it is dangerous to pitch tents on them.

Weather did not admit of our reaching the sources of the glacier at once. On the first attempt, which lasted two or three days, we camped far up the glacier at 18,000 feet, but were driven down in a stinging snow-storm early the next day. Two weeks of very fine weather, however, soon set in, and we were able to accomplish in this time what under the usual summer Himalayan climatic conditions might take six weeks of running backward and forward, for in order to visit what is to be seen at the Siachen sources, clear skies are essential.

Contrary to the usual conditions on this glacier, it was found possible to cut out terraces and camp on a mountain flank at 18,500 feet, just below the high snow-fields leading to the north and north-east heads. From here the north saddle or very apex of the Siachen was ascended. Various facts of much interest were observed there, but these are notes of where we went and not a narrative of what we saw. This saddle is at an altitude of 20,900 feet. The north-east col was ascended the next day. It is not so arduous as the north one, and is less high, about 19,300 feet. We discovered from here some very high peaks beyond the east Siachen boundary on the Chinese-Turkestan side. These are about seven miles north of and are higher than Teram Kangri: one is probably well over 25,000 feet, but it is futile to discuss heights of peaks unless one's data can be verified by careful triangulation.

After another climb to a ridge of 19,700 feet for observations and photography, Dr. Hunter Workman and I headed the caravan toward the glacier leading to the west Siachen source. We descended the main stream, crossing to the (orographical) right side. This glacier enters the Rose at about 17,400 feet. Ascending it for several hours we at last found a point free of crevasses where a camp on snow was pitched at 18,700. We passed three nights here, which made a serious impression on the coolies, there being no lakelets nor running streams such as are so abundant on the main glacier. A peerless white peak heads this glacier to the west, of (probably) 24,000 feet: the exact height will be known later. It is connected by a high col with a lower snow peak, and at the base of this lower peak is another col or depression.

The higher saddle was first ascended, height 19,700 feet, and from it the source of a large glacier was seen about 4000 feet below where we stood. The following day the lower depression was examined, and, as I hoped, it proved to be the main outlet from the west Siachen source, the summit of a rather difficult, but feasible pass for a loaded caravan to the glacier above mentioned lying west. Next an ascent was made to a wide snow plateau lying directly under the chief summit of the 24,000 foot peak. This plateau is at over 21,000 feet, and offered very fine views of the Hidden Peak, Gusherbrum, and other giants of the region.

Our stint of wonderful weather was now ended, and a snow-storm drove us down to the Siachen. I saw clearly though, that, after our work on the lower part was finished, a return would have to be made to this icy head and the Rose glacier finally left by the passage here discovered.

After we had descended the glacier the 11th August found us again on the high Siachen awaiting a chance to advance to the pass. Here fog and snow-storms held us prisoners for nine days. At the beginning of this detention I ordered forty coolies to return under two Europeans over the Bilaphon for flour, which was now running short. This brought on a strike which lasted eighteen hours. They refused to go for supplies, saying, if they went, they would not return. Their long visit to the sources had made a deep impression on their minds, and they declared they would not return there. Finally, upon the wazir explain-

ing that, if they crossed the new pass, they would have only two days on snow and then be always on moraine down to villages, they gave in and no further complaint was heard. Flour arrived, and one bitterly cold morning under a leaden sky we started with sixty-six coolies laden with provisions for ten days.

Although it did not appear to be far enough north, we thought the pass might afford a passage to the Baltoro glacier. If not, we should find ourselves probably on the Kondus, which was surveyed in 1911 by our topographer. Either way would be new and interesting: the Kondus more novel because bearing no footprints of illustrious predecessors, and from the fact that our 1911 expedition had not pushed up to its extreme upper portion. We camped a few hundred feet below the summit of the pass in a freezing temperature, for by 3 P.M. it was snowing hard. By 6 P.M. it cleared. After a cool night under canvas, minimum temperature 3° Fahr., we ascended under a deep blue sky to the col. Here a boiling-point reading was taken and numerous photographs. The pass works out, pending later data, at 19,000 feet.

Kind indeed was the weather god, who had allowed us three weeks before under sunlit skies to discover this new passage, and again after dreary cold days of waiting drew back the curtain of mist for a day, permitting my caravan of sixty-six to pass safely to the other side under the fairest of skies. The descent to the glacier is of about 3000 feet. It was smooth going for, say, a quarter of the way down, but after that the surface was seamed from side to side with wide crevasses, some open abysses, others treacherously covered by soft snow. We reached moraine for camping below the source of the new glacier, which is at somewhat over 16,000 feet.

The next day it became evident we were on the upper Kondus, and the worst monster of a glacier to travel on we have met with in the Karakoram. After one short march from its head ice-bands and easy moraine end, and for four days moraine-strewn ice-hillocks, often four to five hundred feet high, must be steadily clambered over. Owing to the danger of stones falling from the perpendicular mountain walls on its sides no camps even to the end of its tongue can be pitched except on the tops of these depressing hillocks.

Sometime I shall have something to say as to whether the Siachen is a complement of the Baltoro and what are the chances of a passage from one to the other, likewise upon the mythical Kondus and Chogolisa saddles.

I am glad to have carried out with fair completeness the task, which has kept me two summers in India, and I think the work will, perhaps, be appreciated by future geographers in the days when the special examination and survey of more restricted unknown areas than vast polar continents becomes the vogue, as it must perforce in years to come. At least not having the pioneer exploring to do, they will be spared the expense, the ennui with irresponsible coolies, and the many obstacles which the Siachen offers as a region for exploration, such as being separated from all base of supplies by two glaciers and a snow-pass like the Bilaphon, and from wood by a distance of at least thirty miles.

Still, I am satisfied, and pay my deep salaams to the weather god, for, without his aid, the survey of so huge a glacier could not have been completed, nor could I, considering the perfidious actions of the only headmen available, and the prodigious pilferings of the Saltoro valley coolies, have had the rare privilege of first standing on two new points of the north-east Karakoram water-parting, of observing their relation to Chinese Turkestan, and of attaining other heights of geographical interest on this the largest and longest Himalayan glacier. Other geographical and glaciological features were studied, some relating to questions already discussed, but not settled, which must be reserved for detailed treatment. Mr. Grant Peterkin and his assistant made a full survey of the Siachen from its sources to the end of the tongue at the Nubra River, including its numerous tributaries.

I would add that one of my Italian porters, through momentary carelessness in not testing the ice with his axe, fell into a deep crevasse, carrying with him the only rope with us at the time. He remained there one and a half hours before ropes and the guides were available to extricate him, and died of shock and the effects of cold the same night. I was walking directly behind him, and, supposing him to be on the watch for crevasses, noticed nothing until I saw him disappear two steps in front of me. Fortunately I held up on the brink of the chasm and called to the caravan ascending a short distance below.

I mention this, because, owing to untrue stories being spread by Skardu coolies, garbled reports were published all over the world by the press. It is a source of satisfaction to me, that no coolies in my party were seriously injured or died on the glacier, for the Siachen is incomparably more difficult to move about on than any of the five great Karakoram glaciers, all of which, except the Baltoro, we know pretty thoroughly. One special danger for loaded coolies is water. In crossing the Siachen opposite Teram Shehr, a distance of about three miles, eleven glacial streams were met with this season. Three are at least ten feet wide, and so deep that it was impossible to ford them after 11 A.M.

THE SOUTH POLE: A REVIEW.[1]

THE expedition of the *Fram*, which Captain Roald Amundsen led to South Polar regions, was not designed as a scientific expedition. It made no pretensions on that score, and that must be borne in mind in estimating its scientific results. "Our object was to reach the Pole—everything else was secondary," writes Captain Amundsen. "On this little détour science would have to look after itself; but, of course, I knew very well that we could not reach the Pole by the route I had determined to take without enriching in a considerable degree several

[1] *The South Pole: An Account of the Norwegian Antarctic Expedition in the Fram, 1910-12.* By Roald Amundsen. Translated from the Norwegian by A. G. Chater. Maps and illustrations. Two vols. London: John Murray, 1912. *Price* 42*s. net.*

branches of science." The reasons which led Captain Amundsen to make this "détour" are a curious reflection on the spirit of the age. Amundsen's whole interests lay in North Polar regions; no doubt he must have heard the call of the North Pole, but he had never answered it, for all his inclination led to solid, useful, scientific exploration, and he is not the man to abandon his ambitions however strong the temptation. The *Fram* had been lent by the Norwegian Government to Captain Amundsen for a five years' drift across the North Polar basin, on the lines of Nansen's famous expedition, for magnetical, meteorological, and oceanographical work. The attainment of the North Pole was merely incidental, and no stress was laid upon it. Then in September 1909 came the news of the discovery of the North Pole. Amundsen's funds were far short of the amount required, and now the stimulus to contribute was gone. Once the Pole was reached, who would pay for a Polar expedition? "Just as rapidly as the message had travelled over the cables I decided on my change of front—to turn to the right-about and face to the south." There, by a piece of record-breaking, so alien to the custom of the man and his work, Amundsen felt he could put his projected Arctic expedition on its feet when otherwise he must fail for lack of funds. It was a strange use to find for the South Pole, but more than justifiable when it was the only means of arousing public support for scientific work. And it was a courageous decision, for failure to get to his southern goal would necessitate the abandonment of the northern explorations; but Amundsen did not think of failure. The possibility of it seems never to enter into the scheme of his plans. And indeed when once this remarkable man and his band of Norwegians had turned towards the Antarctic, any one who knew the nature of the task and the calibre of the men felt that the South Pole was as good as reached. There could be no failure: success was a foregone conclusion.

On December 14, 1911, when the Pole was reached—a date that will be memorable as long as deeds of daring are cherished for their own sakes—Amundsen's feelings were curiously mixed. He writes: "I cannot say—though I know it would sound much more effective—that the object of my life was attained. That would be romancing rather too barefacedly. I had better be honest and admit straight out that I have never known any man to be placed in such a diametrically opposite position to the goal of his desires as I was at that moment. The regions round the North Pole—well, yes, the North Pole itself—had attracted me from childhood, and here I was at the South Pole. Can anything more topsy-turvy be imagined?"

But he knew that the success of his cherished northern expedition was assured, and, though it meant little to this man, he had won imperishable fame. For we are men first and geographers after, in so much as, deprecate as we will a race to the Pole, the feat is one that fills us with admiration, especially when it is accomplished with the success and skill of Captain Amundsen's journey.

Captain Amundsen himself gives an account of his expedition in this issue of the *Magazine*, so that we need not recapitulate any of the details here. But he has made so light of the difficulties encountered,

both in his lecture and in his book, that they tend to escape notice. It was a bold move to take an entirely new route to the Pole, but it was fortunate for geographical science. We now know the details of two tracks into the heart of Antarctica, that of Sir Ernest Shackleton and that of Captain Amundsen. The former route, which was to be used by Captain Scott, Amundsen considered out of bounds, and although it was always maintained that Captain Scott's expedition was for scientific exploration, and looked on the attainment of the Pole as quite incidental, Amundsen cabled him to New Zealand of his change of plans and his intended line of attack. For the same reason Edward Land was avoided, though, as later events proved, Captain Scott was unable to land a party there with a second base. The Norwegian base was therefore on the Ross Barrier in 78° 38′ S., 163° W., at the Bay of Whales, where Amundsen found the Barrier was aground, probably on reefs or low islands. From here to the Pole and back the course followed, which was very nearly along the meridian, was 1860 miles, and the time taken ninety-nine days. The success of this marvellous journey was not due to luck, but to the experience, capability, and endurance of the men, their utilisation of ski, in which they were all experts, and their employment of excellent Eskimo dogs, which they not only cared for above all other things, even themselves, but thoroughly understood how to handle. It is not a little curious that on this record sledge journey dogs should have been used, the earliest method of sledging, and that more modern expedients, motor or ponies, should have played no part. The dogs are the burden of this story on almost every page: "dogs first and dogs all the time" was the watchword of the expedition. And they served their masters well.

While one party of five men made the southern journey, another of three men went east to explore Edward Land. Both brought back important geographical results which earned for Amundsen the medal of this Society. These results we noted in a previous article (see this *Magazine*, xxviii. pp. 204-208), but the present volumes amplify the information then available.

The Ross Barrier, at least at the Bay of Whales, Amundsen believes is aground. That bight Amundsen believes to be the same, but for slight changes in outline, as was observed by Sir James Clark Ross. Sir Ernest Shackleton came to a different conclusion, but his visit to the Bay of Whales in 1908 was a hurried one. When he saw the ice in the bay breaking up, he abandoned the idea of wintering there. "Otherwise," says Amundsen, "the problem of the South Pole would probably have been solved long before December 1911. With his keen sight and sound judgment, it would not have taken him long to determine that the inner part of the bay does not consist of floating barrier, but that the barrier there rests upon a good solid foundation, probably in the form of small islands, skerries or shoals, and from this point he and his able companions would have disposed of the South Polar question once for all." Off the south-western end of the bay are a number of stranded ice-islands, between which Lieutenant Prestrud got depths of as much as 200 fathoms. The shallowest soundings are not recorded. This is about

200 miles from Edward Land, and from the irregularities in the ice-surface south of the Bay of Whales, it seems probable that the barrier on its eastern side has overridden low-lying land, or else is resting on a shelf not far below sea-level.

The mountains to the south of the Ross Sea, which Shackleton named the Commonwealth Range, are continued in Prince Olav's Mountains, to the south-west of which Amundsen ascended to the plateau by the Axel Heiberg glacier (see map at end). Amundsen made the most important discovery that the main line of peaks from there is continued not towards Graham Land, but towards Coats Land, in the range named after Queen Maud, while in about 86° S., 160° W., another range strikes away to the north-east: this bears no name on Amundsen's map, but in the text it is called Carmen Land. It was definitely established from 86° to 84° S., and on the return journey, when the party was in 81° 20′ S. they saw, to the south-east, high bare land running north-east and south-west with "two lofty white summits to the south-east, probably in about 82° S. Although what we have seen apparently justifies us in concluding that Carmen Land extends from 86° S. to this position—about 81° 30′ S.—and possibly further to the north-east, I have not ventured to lay it down thus on the map. I have contented myself with giving the name of Carmen Land to the land between 86° and 84° and have called the rest 'Appearance of Land.'" Such caution is admirable, but it will likely enough result in some explorer in the future taking unto himself the credit for the discovery of this land. "Appearance of Land" is only marked between 81° and 82° S.: Amundsen's chart is left blank between 82° and 84° S.

A party under Lieutenant Prestrud was sent to examine Edward Land since the *Terra Nova* had failed to land a party there the previous summer. The Alexandra Mountains of Scott were seen, snow-clad from end to end, and Scott's Nunatak (1700 feet) was climbed. Here were obtained the first rock specimens known from Edward Land, and they prove to be of the highest importance. They consist of granitic rocks and crystalline schists, and are identical with those brought by the southern party from Mount Betty beside Axel Heiberg glacier in 85° S. Moreover, they agree so closely with the rocks of South Victoria Land that we can now say that an identity of structure has been established all round the Ross Barrier. Edward Land undoubtedly seems to belong to the plateau formation of Victoria Land, and the presumption grows in strength that the Ross Sea is a rift valley. This exploration of Edward Land was, of course, not exhaustive, and we hope that Captain Scott will extend his earlier discoveries there, but it may be said now, with fair certainty, that the folded ranges of Graham Land do not reach the Ross Sea, and that the Ross Sea is a great bight and not—if indeed any one ever seriously believed so—the end of a transcontinental strait.

In addition to these geographical discoveries the Norwegian South Polar Expedition obtained an important series of hourly meteorological observations at their winter quarters from April 1911 to January 1912. These will enhance the value of Captain Scott's more extended observations to the west. The meteorological equipment was not as complete

as it might have been, but every possible care was taken over the observations, and several of the party were practised observers.

The only other scientific work consisted of an oceanographical cruise of the *Fram* in South Atlantic. During July and August 1911, Captain Nilsen took temperatures and salinities at sixty stations between 15° and 35° S. from South America to Africa and back. At nearly all the stations the observations were taken at twelve depths down to 545 fathoms. They are discussed in an appendix to the book. Valuable as they are, we feel it somewhat disappointing that a ship like the *Fram* did not do this work in higher southern latitudes in the South Atlantic where the work is even more required, and where the ordinarily con-

Packing sledges in the snow-house.

structed ship could not work with the same safety and success as the *Fram*.

Other appendices deal with the construction of the *Fram*, by Commodore Christian Blom, and the astronomical observations taken at the Pole.

Some criticism has been levelled at Captain Amundsen for competing with Captain Scott for the Pole. It would serve no purpose to discuss that matter in these pages, and we consider that criticism most unfounded, and certain to be little to the liking of Captain Scott himself. Writing of the British expedition, Captain Amundsen says, "Our preparations were entirely different, and I doubt whether Captain Scott, with his great knowledge of Antarctic exploration, would have departed in any point from the experience he had gained and altered his equipment in accordance with that which I found it best to employ. For I came far short of Scott both in experience and means." There is one

deed in the relationships of these two expeditions which is not recorded in these volumes, and speaks much for the goodwill of Captain Amundsen towards the British expedition. When the *Fram* was lying in the Bay of Whales in February 1911, unloading stores for winter quarters, the *Terra Nova* arrived from the east after failing to effect a landing on the difficult shores of Edward Land. Captain Amundsen suggested to Lieutenant Pennell, the commander of the *Terra Nova*, that Lieutenant Campbell and his party should land on the Barrier, and winter near the Norwegians, so that the British party could carry out their original plan of exploring Edward Land. In this case Captain Amundsen would not have sent a party eastward, but would have left Edward Land entirely to Lieutenant Campbell and his men.

To Sir Ernest Shackleton Captain Amundsen pays many tributes. "The name has a brisk sound. At its mere mention we see before us a man of indomitable will and boundless courage. He has shown us what the will and energy of a single man can perform." "Shackleton's exploit is the most brilliant incident in the history of Antarctic exploration." When they reached 88° 23′ S., Shackleton's farthest, we read, "We did not pass that spot without according our highest tribute of admiration to the man, who—together with his gallant companions—had planted his country's flag so infinitely nearer to the goal than any of his precursors."

Captain Amundsen writes well, in a straightforward style devoid of any affectations. The chapter on the winter life at *Framheim* is a fine piece of vivid writing (see illustration). We have seldom read a book of travel in which the personal note is less sounded; every one gets his due share of praise and notice, so that we make the acquaintance of all the expedition as we read the pages, and when we close the book we feel the richer for having met a band of remarkable men. The book will become the classic of Antarctic travel.

There is a brief preface by Dr. Fridtjof Nansen, and several chapters by Captain Th. Nilsen on the voyage of the *Fram*. The index is not perfect, and the maps are too meagre for so important a work. The translator's work is well done. The book is well illustrated and we are indebted to the publisher for the three illustrations in this issue and for the map.

R. N. Rudmose Brown.

A GEOGRAPHICAL DESCRIPTION OF EAST LOTHIAN.

By Charles M. Ewing.

(*Continued from* vol. xxviii. p. 641.)

VIII.—General Industries.[1]

East Lothian cannot now be termed an industrial county. A century or two ago there were quite a number of flourishing industries, but most of these, owing mainly to the increasing competition of other countries or other parts of Britain more favourably situated, have either ceased or are seriously on the decline.

One of the most ancient industries was salt manufacture: as early as the twelfth century it is recorded that the monks of Newbattle established ten pans at Prestonpans. The neighbouring town of Cockenzie, too, has from early times produced large quantities of salt from brine. Since the repeal of the salt duty in 1826, this industry has shrunk to insignificance. Numerous attempts were made in the late seventeenth, eighteenth, and nineteenth centuries to establish cloth, textile, and other allied industries. Thus the Scottish Cloth Manufacturing Company commenced work on a large scale at Haddington in 1681, but wound up in 1687: woollen mills were established in 1730 at Haddington and Dunbar: at Ormiston in 1730 Cockburn set up what seems to have been the first bleaching-fields in Scotland, fine linen having been previously sent over to Haarlem for this purpose: cotton and linen factories flourished at Dunbar between 1801 and 1821, as many as 400 to 500 hands being employed: while stocking weaving and dyeing, for which madder was grown at Aberlady, were formerly largely carried on at Haddington. Among other industries that have disappeared are distilling at East Linton, where prior to 1840 as many as 500,000 gallons of whisky were sometimes produced annually: the manufacture of roofing tiles, bricks, and drain-pipes at Dunbar, and of vitriol and sal-ammoniac at Prestonpans.

Now the chief industries at Haddington are the manufacture of Bermaline flour, of agricultural implements, of woollens and sacking, with brewing and tanning: while at Prestonpans there are soap-works, breweries, factories for the preparation of bone-dust and feeding stuffs, and extensive pottery, fireclay, and brick works. Agricultural implements and other farming accessories are turned out at Dunbar.

IX.—Fisheries and Shipping.[2]

About a mile from the Midlothian border is the harbour of Morrison's Haven. It seems to have been known as a harbour long before Leith, and is said to have been first used by the monks of Newbattle for the

[1] Chief sources are the *Statistical Accounts*, Martine, Croall.

[2] Chief authorities: *Fisheries Report*; *North Sea Pilot*.

export of salt and coal. It was not, however, till after 1526, when the harbour seems to have been reconstructed on a larger scale, that Morrison's Haven became an important commercial port: in fact we learn that, at this time, the trade of Morrison's Haven and Port Seton together rivalled that of Leith. The present harbour has an area of four acres, a depth of 13 to 14 feet at high water, an entrance 70 feet wide, and is connected by a goods line with the North British Railway. It is now the only port in the county where foreign trading vessels call with any regularity. Its chief exports are coal, earthenware, and pottery goods, bricks and tiles.

Prestonpans has no harbour, but possesses four fishing-boats, totalling 101 tons, and has 20 resident fishermen.

Further east are the two most prosperous fishing ports in the county —Cockenzie and Port Seton. The fishermen here are very industrious and enterprising. Many of them follow the herring round the coasts of Britain, and are usually very successful. In 1910 the Fisherrow and Cockenzie fishermen conjointly employed 29 boats in the English, and 9 in the Irish fishing, and their total catch—£10,500 in value—amounted to 9635 crans.[1] Port Seton harbour is hollowed out of rocks of the Coal-Measures, and much of its masonry reposes on hard rocks of Millstone Grit. That of Cockenzie is well protected behind an east-and-west dolerite dyke. It has an area of three acres, an entrance 78 feet wide, and a depth of 12 to 13 feet at high-water, but its approach is rendered dangerous by the sunken Corsik Rock, about 250 feet offshore.[2] The oyster-beds of Cockenzie—now exhausted—were once celebrated, 20,000 oysters being sometimes obtained annually in the eighteenth century.[3] In 1910 the total number of fishing-boats at Port Seton and Cockenzie was 133 (76 with keels of upwards of 45 feet): 606 men and boys were employed in the fishing industry, and 12,856 cwts. of fish, realising £9881, were taken—mainly in the Firth of Forth and off the Isle of May. Aberlady was once the port of the county town, and, sixty to seventy years ago, considerable quantities of bark, linseed oil, and guano were here imported.[4] The channel of the Peffer stream, which joins the south side of the bay, admits of vessels drawing not more than 9 feet of water, but it is now seldom used.

There is a small harbour at North Berwick, one acre in area, with an entrance 25 feet wide and a depth at high tide from 10 to 11 feet.[5] Opening as it does to the west-south-west it is extremely difficult of access in a north-east gale. In 1910 there were six fishing-boats with a total tonnage of 11, and 15 fishermen and boys; 526 cwts. of fish (more than half shell-fish) were taken.

For long Belhaven was the port of Dunbar. In the seventeenth century Dunbar was the largest fishing centre in Scotland, and its importance was greatly enhanced when a harbour—now called the Old Harbour—towards the construction of which Cromwell gave £300, was erected at Dunbar itself shortly before the Restoration. It has an entrance of

[1] *Fisheries Report.*
[2] *North Sea Pilot.*
[3] *Statistical Account* (1791-99).
[4] *Abridged Statistical Account* (1845).
[5] *North Sea Pilot.*

40 feet, an enclosed space of 2½ acres, and a depth of 10 feet at high tide, but a sunken rock outside, called the Outer Buss, makes approach perilous in rough weather.[1] From 1752 to 1804 Dunbar was the headquarters of the prosperous East Lothian and Merse Whale Fishing Company. During the eighteenth century it carried on a considerable export trade, the chief articles shipped being corn, whisky, fish, wool, and hides. In 1792 it had 16 ships with a total tonnage of 1505, besides 2 Greenland vessels of 675 tons. In the first twenty years of the nineteenth century the fishing industry was especially flourishing, and we learn that in 1819 no fewer than 200 fishing boats belonged to the port, supplying 30 to 60 crans of herrings per day in the season, while 35,000 barrels of herrings were cured.[2] A few years later a decline in trade set in, for while in 1830 as many as six Dunbar vessels were engaged in the timber and grain trade with the Baltic, and thirty in the coasting trade, there were only 11 ships altogether in 1851, with a total tonnage of 658. In 1862 the Victoria Harbour, for which an entrance had to be cut through the solid whinstone on which the castle stands, was constructed farther to the west. It has an entrance to the west 50 feet wide, a depth at high water of 12 feet,[3] and is four acres in extent. During fierce onshore gales the heavy swell within the harbour causes serious difficulty. Its construction, however, did not materially arrest the decline of Dunbar's general trade, and now it is little more than a fishing-port. In 1910 there were 29 fishing boats; the fishing industry gave employment to 125 men and boys; and 7144 cwt. of fish—of a value of £2566 (£1318 representing shell-fish)—were taken.

X.—Mining.[4]

After agriculture, coal-mining is the chief industry of the county. Some of the mines in the Prestonpans-Tranent area were worked at least as early as the twelfth century, and are said to be the oldest in Scotland. Coal was mined at Penston in Gladsmuir parish in the fourteenth century, and at the time of the Commonwealth produced a revenue of £400.

The coalfield of East Lothian is some 30 miles in area. It is confined to a region bounded by a line drawn from Port Seton through Gladsmuir to the confluence of the Birns Water and Kinchie Burn on the east, by the latter stream on the south, by the county boundary on the west, and by the coast on the north. It occupies the eastern and smaller of two synclines separated by the anticlinal Roman Camp upland, the western forming the Midlothian coalfield. The gentleness of the dip of the coal-bearing strata and their insignificant depth in parts made them workable even in very early times, and account for the fact that in places the best seams are exhausted. The only coal-bearing formations of consequence in the county are those belonging to the Edge Coal Group, the middle member of the Carboniferous Limestone series. Nine different seams yield coal in quantities sufficient to be profitable: of

[1] *North Sea Pilot.* [2] *Abridged Statistical Account* (1845). [3] *North Sea Pilot.*
[4] *Report of Mines and Quarries; Geological Memoir* (Economics).

these the Great Seam (maximum thickness at Prestonpans, 7 feet) is the chief. According to the estimate of Hull, who had not fully realised the submarine possibilities of the coalfield, there were in 1880 still 86,849,000 tons of coal to be mined in East Lothian, above the 4000-feet limit. The following is a list of mines at present worked within the county:[1]

Name of Company.	Name of Locality of Mine.	Persons Employed.		Kind of Coal and other Minerals.
		Under-ground.	Above-ground.	
Bankpark	Tranent	100	15	Household and steam.
Edinburgh Coll.	Bankton	255	34	Household, manufacturing, steam.
,,	Elphinstone	283	46	Household, manufacturing, steam.
,,	Northfield	...	...	...
,,	Preston Links	350	40	Household, manufacturing, steam.
,,	Tranent	240	33	Household, manufacturing, steam; fireclay.
Ormiston	Meadow	60	14	Household, manufacturing, steam.
,,	Ormiston Station	158	33	Household, manufacturing, steam; fireclay.
Riggonhead	Penston	195	45	Household, manufacturing, steam.
,,	Riggonhead	71	14	Household, manufacturing, steam.
Summerlee Iron	Prestongrange	759	152	Household, manufacturing, steam; fireclay.
White and Co.	Tyneside	38	6	Household, manufacturing, steam.
Woodhall	Pencaitland	130	37	Household, manufacturing, steam.
	Total	2639	469	

Total output for county (1909), 1,048,499 tons.

One of the most prosperous mines in the county, the Preston Links Colliery, is partially submarine; it has, in fact, recently taken a new lease of life since the dolerite dyke, running from Port Seton to Cockenzie Harbour, and cutting right through the Great Seam, was pierced, and coal began to be worked to seaward of the dyke.

The future prosperity of East Lothian coal-mining will probably largely depend on the productivity of these beds extending beneath the Firth; and if the Coal-Measures which geologists believe to occur under the sea off the East Lothian coast can also be reached, it may be long before mining in Haddingtonshire can be called a declining industry.[2]

The only other materials at present worked in the county are blaes,

[1] From *Report of Mines and Quarries.*

[2] *Geological Memoir.*

a kind of shale, and fireclay. In 1909, 20,464 tons of the former, and 14,100 of the latter were obtained. The fireclay which is found associated with coal seams has given rise to the considerable manufacture of bricks, tiles, and pottery at Prestonpans.

At the old Dolphingstone colliery and at Penston, blackband ironstone (10 and 14 inches thick respectively) was worked up to 1880, and at one time as much as 100 tons a day was brought to the surface. Haematite was discovered on the Garleton Hills in 1866, but was mined for only a few years.[1] Ironstone of good quality exists on the farm of Garvald Grange: it is, however, doubtful whether the extension of the Gifford Railway would, as one writer opines, make the working of it practicable. Copper has been found in various parts of the Lammermuirs, but never in sufficient quantities to be worked.

XI.—Quarries.

Thirty quarries are at present worked in East Lothian, and 100 people employed. In 1909 48,862 tons of stone were quarried, of which 18,611 were limestone, 3667 sandstone, and 26,584 igneous rock.[2]

The building stone used in the county is mainly sandstone or of igneous origin.[3] Much of Dunbar is built of a poor red sandstone obtained from the neighbouring Old Red Sandstone quarries. A common stone used for building purposes in East Linton district is porphyritic basalt, while much of Haddington burgh is built of porphyritic trachyte, obtained from Peppercraig quarry, on the southern slope of the Garleton Hills. The chief building material in North Berwick is the reddish phonolitetrachyte of North Berwick Law, which is somewhat decomposed and easily worked. Perhaps the best building stone in the county is a light coloured, easily worked, yet durable sandstone belonging to the Calciferous Sandstone Series, and occurring in the south-east corner of the county in the neighbourhood of Dunglass.

For road metal the more basic igneous rocks are most suitable. The chief source of supply at present is the trachytic phonolite quarry of Traprain Law. This stone, however, is not ideal, as it is difficult to work, yet brittle, and offers a somewhat rough surface in summer. Better road-metal is obtained at the Kidlaw Quarry (three miles south-west of Gifford), at Millstone Neuk, near Dunbar, and at Gosford Bay, near Aberlady. The two latter are not, however, accessible at high tide. The only sedimentary rock used for road-metal in the county is the Silurian greywacke—a soft stone suitable only for by-roads.

Limestone is worked within the county for agricultural, smelting, and building purposes. The Skateraw Quarry, near Dunbar, was formerly extensively worked, as much as 4000 tons being in some years shipped to Devonshire; now 30 to 40 tons per day are obtained here, of which two-thirds are sent to the west of Scotland for smelting, and one-third is

[1] *Geological Memoir.* [2] *Report of Mines and Quarries.*

[3] *Geological Memoir* (Economics) is chief authority for rest of this section.

used locally for agricultural purposes. The stone of the Harelaw Quarry, near Longniddry, contains 96 per cent. of carbonate of lime, a fact which renders it useful alike in farming, in building and plastering, and in gas purifying.

XII.—Communications.

Just as the hills and uplands of East Lothian run in an east-and-west direction, so the main routes have developed along east-and-west lines. In most parts of the county north- and south-running roads have been more difficult to construct, and have had more difficult gradients to surmount. An aeroplane setting out for Berwick-on-Tweed from Edinburgh would proceed straight across the Lammermuirs, south-east of Gifford, but so difficult has it been found to cross these hills that practically all traffic bound for Berwick has been diverted to the west by way of Lauderdale, or to the east by way of the much more important route through Dunbar and Ayton.

[1] In early times there was but one fairly easy route from England to the Scottish capital, viz. that by Dunbar. To reach it from Carlisle the lofty southern uplands had to be traversed. From Norham, Coldstream, or places higher up the Tweed, the direct way was rendered difficult by the Moorfoots and Lammermuirs. Two routes across the latter, now rough and little frequented roads, must indeed have at one time been considerably used. One traverses the hills from the upper Whitadder valley to Garvald, and its former importance is shown by the fact that its northern exit from the hills was defended by two castles —Castle Moffat and White Castle. The other, farther west, also defended by forts called the Black and the Green Castles, and almost certainly the route taken by the Highlanders under Mackintosh of Borlum in 1715, crosses the hills from Longformacus to Gifford. But the most frequented route was that followed by the present Great North Road via Ayton and Dunbar; by this way Edward I. reached the Lothians in 1296 and 1298, Somerset before the battle of Pinkie in 1547, and Cromwell in 1650. Yet even this way was not without its difficulties; slightly south of Cockburnspath is the narrow gorge by which it cuts its way through the Eastern Lammermuirs; of it Cromwell said that "ten men to hinder were better than forty to make their way." Moreover, just to the south of Dunbar, invading armies could easily be brought to a standstill; here in 1296 Edward I. was opposed by the Scots, and on the same ground Leslie threatened Cromwell's retreat to Berwick in 1650.

West of Dunbar the Great North Road proceeds to East Linton, and thereafter, though a much easier route lies to the north, is carried over somewhat hilly country to reach the county town. From Haddington there is a long and tedious ascent to Gladsmuir (355 ft.), and only $1\frac{1}{2}$ miles west of Tranent does the road leave the upland. Now that traffic is

[1] Chief authority in this paragraph: Kermack, *A Geographical Factor in Scottish Independence* (*S.G.M.*, Jan. 1912).

returning to the roads, it is rather unfortunate that the only direct road of the first class between Dunbar and the capital should require to surmount these uplands; as the trade of Haddington itself is now of minor importance, a direct road from East Linton to Drem should be constructed, and the road thence to the capital improved.

The other roads of East Lothian are mainly used by local traffic. A good road skirts the base of the Lammermuirs, and connects Dunbar with Garvald, Gifford, Humbie, and Dalkeith in Midlothian. Another proceeds from Dunbar to North Berwick: formerly it passed through East Linton, but since 1750, when the new bridge over the Tyne at Tyninghame was constructed, its course has been farther to the east; from North Berwick it continues westward along the coast, and as it connects the rising watering-places along its course with the capital it has recently become one of the busiest roads of the county. The north-and-south roads are mainly connecting links between the more important villages on the east-and-west high roads. There is, however, one exception. The burgh of Haddington, owing doubtless to the former importance of its local traffic, is a distinct centre on which no fewer than eight roads from neighbouring towns and villages converge. Of these perhaps the most interesting is the old, yet well-built road which was carried over the steep slope of the Garleton Hills (road summit 451 feet) to Aberlady, the former port of Haddington.

All the railways in East Lothian belong to the North British Railway Company. There is one mile of railway to every five square miles.

The chief railway of the district, opened in 1846, is a section of the East Coast route from Edinburgh to London. While it avoids the uplands traversed by the great high road, it unfortunately loses the considerable traffic of the populous coastal strip in the west by running quite a mile inland as far as Longniddry. Here two branch lines diverge, one to the north to the watering-places of Aberlady and Gullane, the other to the south-east, over a considerable incline to the county town. At Drem, 4½ miles farther on, a branch line proceeds to the north to North Berwick. A considerable saving in railway construction would have been effected had it been possible to continue the Gullane line direct to North Berwick, but long before a branch to the former was contemplated, the Drem-North Berwick Railway had been constructed. From Longniddry to Dunbar the main line follows the most level part of the county. Beyond Dunbar it runs through the fertile coastal strip, and just north of the Berwickshire boundary it ascends to 150 feet, its highest point throughout the county. At the time of the construction of the main line the people of Haddington were greatly opposed to its passing through this burgh: this, it is alleged, was the reason why it took a more northerly course, but it seems probable that the present course of the railway was decided upon by the much easier gradients and by the greater accessibility to the rising coastal resorts.

Just before Inveresk station in Midlothian, a branch railway leaves the main line, enters the county near Crossgatehall, and proceeds via Ormiston to Macmerry. It was constructed primarily as a mineral railway and must have paid better when iron was worked at Macmerry.

Four years ago a branch line was opened from Ormiston to Gifford, the main purpose of which was to provide a more direct outlet for the agricultural produce of south-west East Lothian. Though called the Gifford and Garvald Light Railway, it has yet to be extended to the latter place, it is doubtful whether the extension of the line to this thinly populated neighbourhood would prove a financial success. Between Ormiston and Gifford the country is irregular and hilly, and just beyond Humbie the line reaches an elevation of 521 feet.

From Joppa, three miles to the east of Edinburgh and connected with the capital by cable tramway, an electric tram-line, completed in 1909, runs through Musselburgh to Levenhall, just beyond which it reaches the Haddingtonshire border. Thereafter it skirts the shore of the Firth of Forth, and after passing through the thickly populated places called Morrison's Haven, Cuthill, Prestonpans, and Cockenzie, terminates at the fishing-village of Port Seton, ten miles distant from Edinburgh. As Morrison's Haven and Port Seton are two miles, and the other places mentioned at least one mile distant from the nearest station, this tramway has had the effect of diverting much of the passenger traffic from the railway, even travellers bound for Edinburgh making use of the tramway as far as Musselburgh station, which is connected by a cheap and frequent service of trains with the capital.

XIII.—Distribution and Statistics of Population.[1]

At present there are four areas in which the population of East Lothian has chiefly concentrated—(1) the Haddington district; (2) the Prestonpans, Tranent, Port Seton, Cockenzie, Ormiston and Pencaitland district; (3) the North Berwick, Gullane, and Aberlady coastal strip; (4) the Dunbar and East Linton district. The choice of Haddington itself by the monks who founded the abbey in 1178 can easily be understood. It lies in a fertile hollow, and on the banks of the Tyne, a river that supplied abundance of water for domestic and agricultural purposes as well as for the working of mills. It is sheltered from the north and east, and is well concealed on the south and east, a fact of considerable importance in times of English invasion. Though it has declined much in relative importance it is remarkable how little the county town has varied in size during the last three centuries. Its population is chiefly held together nowadays by the fact that it is the county town, a considerable agricultural centre, and has a number of industries. The dense population of district (2) is to be explained in several ways. Prestonpans owed its rise to the establishment of salt pans and coal mines in the twelfth century, and on the coal and other industries its inhabitants are still dependent. There are no natural advantages in the high, inhospitable site of Tranent, where until the recent water-supply from Pathhead, on the north-west slopes of the Lammermuirs, was installed, there had always been a scarcity of water: it is, as it seems always to have been, chiefly a coal town.

[1] Statistics derived from *Preliminary Census Report* (1911); *Detailed Census Report for Scotland*, 1901.

Cockenzie was primarily a place of salt manufacture, Port Seton a port for general shipping: their recent growth, however, has been due to the fishing industry and to their popularity as summer resorts. The Ormiston and Pencaitland populations are partly agricultural, partly mining.

A Cistercian Abbey founded by David I. seems to have formed the original nucleus of North Berwick, and the choice of its site was largely influenced by the presence of the natural stronghold, North Berwick Law, immediately to the south. In the last century North Berwick has entirely changed its character: thanks to its excellent links and bracing air it has become one of the most fashionable resorts in Scotland. Gullane, too, which two centuries ago was an abode of horse-rearers and rather extravagantly termed the "Newmarket of Scotland" by writers of the time, is now simply a golfing resort.

Dunbar grew up around its almost impregnable castle, once the most important fortress between Berwick and Edinburgh, a stout barrier to invaders from the south, and in fact sometimes termed the "key to the Lothians." Protected by this stronghold a considerable fishing and industrial population took up its residence here. It is now a fishing and agricultural centre, and attracts a considerable number of visitors in summer. East Linton, situated on the Tyne where it is crossed by the high road, grew up as a bridge-town. Its population was until half a century ago maintained by local industries, particularly distilling.

By far the least populous part of the county is the Lammermuir hill area, where human habitations are almost entirely confined to the more important valleys.

The population of East Lothian at the 1911 census amounted to 43,253, of which 21,446 were males and 21,807 females. This represents a density of 162 persons per square mile. There was an actual increase of 4582 in the last decade, or an increase per cent. of 11·9. In only five Scottish counties was the increase per cent. within this period greater, that of Dumbartonshire and also of Fifeshire amounting to as much as 22·3 per cent.

Decennial Increase or Decrease of Population in East Lothian.

1801 1811	1811 1821	1821 1831	1831 1841	1841 1851	1851 1861	1861 1871	1871 1881	1881 1891	1891 1901	1901 1911
1064	4077	1018	259	500	1248	137	731	-1017	1180	4588
3·5	13·1	2·9	0·7	1·4	3·4	·4	1·9	2·6	3·1	11·9

Only two of the past decades show a decrease in population, viz. between 1831 and 1841, and between 1881 and 1891, in the latter case to the extent of more than a thousand. After so recent a decrease it is satisfactory to find that the increase per cent. of the past ten years has only once been exceeded, viz. between 1811 and 1821, since the census

began to be taken. Considerable light is thrown on this marked increase by the statistics for the various parishes :—

Name of Parish.	Population in 1911.	Increase or Decrease per cent. in last decade.
Aberlady	963	1·4
Athelstaneford	666	4·9
Bolton	256	−14·1
Dirleton	2064	14
Dunbar	4830	4
Garvald *	511	18·6
Gladsmuir	1433	−3·2
Haddington	5424	5·8
Humbie	679	5·7
Innerwick	676	−13·6
Norham	199	−1·0
North Berwick	3969	8·8
Oldhamstocks	404	−5·8
Ormiston	1598	34·3
Pencaitland	1273	14·5
Prestonkirk	1631	−2·5
Prestonpans	4722	39·6
Salton	386	−10·4
Spott	386	−8·7
Stenton	461	−9·8
Tranent	8677	41·9
Whitekirk and Tyninghame	776	−7·1
Whittinghame	523	·4
Yester	746	2·2

* Navvies at work here in 1901.

The four parishes which show the greatest increase are Tranent, Prestonpans, Ormiston, and Pencaitland, and in all these coal-mining is an important industry, though in Tranent the growing population dependent on summer visitors and the successful fishing industry, in Prestonpans on general industries, and in Ormiston on market-gardening, have all, doubtless, helped to swell the numbers. Notable increases are also recorded in the parishes of North Berwick and Dirleton, due certainly to the large increase of persons catering for summer visitors in North Berwick and Gullane. The only purely agricultural parish that has materially grown in the last decade is Athelstaneford. The most unsatisfactory results are furnished by the eastern group of parishes —Whitekirk, Innerwick, Stenton, Spott, Oldhamstocks, and Dunbar— every one of which shows a marked falling off. They, like Garvald, Bolton, and Salton, are, however, only sharing in that tendency to depletion manifested by so many agricultural parishes in Scotland.

The preponderance of males over females is greatest in the four mining parishes of Ormiston (53·9 per cent.), Pencaitland (52·9 per cent.), Tranent (52·8 per cent.), Prestonpans (52·5 per cent.), and in Salton (57·7 per cent).

There is little difference between the number of males and females

in the agricultural parishes. The preponderance of females over males is most marked in the parishes of North Berwick (55·7 per cent.), Dunbar (53·4 per cent.), Dirleton (52 per cent.), Whitekirk (53·5 per cent.), and Haddington (51·8 per cent.), and in the case of the first three may be mainly attributed to the large amount of female labour required in the summer resorts.

The population of the following burghs within the county has increased in the last decade: Tranent, the largest town in the county (4369 inhabitants), by 58 per cent., Cockenzie and Port Seton (2400 inhabitants together) by 42·3 per cent., North Berwick (3247 inhabitants) by 11·9 per cent., Prestonpans (1923 inhabitants) by 11·7 per cent., and Haddington (4140 inhabitants) by 3·7 per cent. East Linton (population 877), on the other hand, and Dunbar (population 3346) have fallen off by 3·8 per cent. and 6·6 per cent. respectively. The decrease in the case of East Linton was quite to be expected, for while its industries have almost disappeared, it is too close to Dunbar on the one hand, and Haddington on the other, to hold its own as an agricultural centre. But the case of Dunbar is not so easily explained. Not only is it an important station on the main line, and is connected by a fast and frequent service of trains with Edinburgh and Berwick, the North of England and London itself, but it is a considerable summer resort. Perhaps its falling off is chiefly accounted for by the decline of its fishing industry and by the rivalry of the other rather more popular watering places of Haddingtonshire.

The following table shows the percentage of the population of ten years and upwards engaged in each class of occupation at the 1901 census:—

	Total engaged in occupations.	Unoccupied or at present without employment.	Professional.	Commercial.	Domestic.	Mining.	Fishing.	Agriculture.	Other industries.	Miscellaneous occupations (chiefly represented in columns described as "Conveyance of men, goods, and messages," and "Sale of food, tobacco, drink, lodging").
Males, . .	82·5	17·5	3·9	1·5	3·9	10·5	3·8	25·7	17·2	16·3
Females. .	31·5	68·5	1·7	·5	13·2	...	...	9·7	3·6	2·6

These figures show clearly that East Lothian is primarily an agricultural county, no fewer than 5276 persons being engaged in this pursuit. But while this figure has for some time back remained comparatively stationary, the number of persons engaged in mines and quarries has since 1901 almost doubled itself, as we see by comparing the number of persons thus employed in 1901, viz. 1542, with that given in the *Blue Book of Mines and Quarries* for 1910, viz. 3107. The percentage of males without occupation in the county is unusually high,

higher even than that of Midlothian itself, which is the abode of retired people from all over Scotland. North Berwick, Dunbar, Gullane (as well as the county town) are, indeed, inhabited by considerable numbers of the "affluent-unoccupied" for the greater part of the year, attracted hither, no doubt, by the excellent golf and bracing sea air.

XIV.—Conclusion.

In very ancient times mountain-making movements folded and hardened the rocks of the Lammermuir area. Later sand and limestone formations were laid down to north-west and north-east of the great fault, and being much less affected by hardening agents yielded readily to erosion and form much of the lowlands to-day. At the same time volcanic action played an important part and left numerous minor hills, islands, and lava-beds as its memorials. Moreover, as the Forth wore its bed deeper and the land here subsided, access was given to the sea all along the north and north-west of the county. Late in physical history came the Great Ice Age, under whose influence the configuration and more particularly the drainage system was profoundly modified, and much of the county became deeply covered with glacial deposits. Thus in brief were upland, lowland, and the present coastline determined.

On relief and proximity to the sea the climate of the county depends. Being in the rain-shadow of the Lammermuirs, Haddingtonshire has a low rainfall, and being so much hemmed in by the sea it has a small range of temperature, but it is subjected to cold east winds from the North Sea.

The occupations of the inhabitants are mainly conditioned by the structure and relief of the county or by climate, and sometimes by both. Thus the Lammermuirs, too exposed for cultivation, are essentially a pastoral district. The lowlands are on the whole well suited for agriculture by reason of the favourable climate, and of the generally fertile boulder-clay and soils of igneous origin. The lengthy seaboard has encouraged the growth of a vigorous fishing class, whose efforts are more often favoured by a breezy climate than hindered by storms.

Sheep-rearing has given rise to a small woollen industry. Agriculture has called into being the manufacture of agricultural implements and drainage tiles, brewing and flour-milling. Owing to the luxuriant plant-life in Carboniferous times and the preservative qualities of the sediments deposited on it, there is a good supply of fossil-fuel in the west, and coal-mining has arisen, while a number of industries dependent on coal have grown up.

The chief factors affecting the growth of what may be termed the summer-resort industry are the invigorating coastal climate, the abundance of blown sand and raised beaches (for golf courses), and a varied and picturesque seaboard.

The prosperity of agriculture and market-gardening, of fishing and summer resorts, has been increased by the proximity of East Lothian to Edinburgh, and by the East Coast main line, which runs through the county.

The principal centres of population have grown up, either where the conditions for the various industries are most favourable, mining in the west, fishing and catering for summer visitors on the coast, agriculture in many lowland parts, or where water is most plentiful, as at Haddington and East Linton on the Tyne.

Most of the towns now receive their water-supplies from the Lammermuir upland, where, owing to the greater rainfall and the impervious nature of the underlying rocks, numerous reservoirs have been constructed.

The two most important factors in the growth of communications have been relief and population, though the latter has to some extent been a result of communications. The Lammermuirs are crossed by few roads, because travelling here is difficult and the number of inhabitants small. In the lowlands the gradients of east-and-west-running roads are usually easier than those running north and south, and the former are on the whole more frequented than the latter. As the Southern Uplands offer a considerable obstacle to communications between the Central Valley and the south, the easiest and probably the most frequented route from England to Edinburgh passes through East Lothian.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

Lectures in January.

Captain Einar Mikkelsen will address the Society on his travels in North-Eastern Greenland, in Aberdeen, Dundee, Edinburgh and Glasgow, on the 21st, 22nd, 23rd, and 24th, respectively.

GEOGRAPHICAL NOTES.

Europe.

Nature Reserve in Norfolk.—We mentioned here in the last volume, p. 648, the fact that a National Park is being established in Switzerland. According to the *Times*, a small reserve of wild nature is similarly to be established in Norfolk, where an area of about 1000 acres has been placed in the hands of the National Trust. The area has been acquired by the generosity of the Fishmongers' Company and of some private individuals, and consists of a shingle spit and a system of sand dunes and salt marshes together forming Blakeney Point, on the north coast of Norfolk between Sheringham and Wells. From a physical point of view the area is interesting because of the contrast of shingle, dune and marsh, and because of the processes of silting up and so forth which are going on in the region. Again, the vegetation is interesting, including as it

does characteristic salt-marsh plants, notably four species of sea-lavender, the oyster-plant (*Mertensia*), and the curious seablite (*Suæda fruticosa*), a plant of wide distribution which in Great Britain is confined to certain localities on the east and south coasts of England. The point is a favourite breeding-spot for sea birds, and these have been protected for some years, so that there is now a rich fauna; insects, molluscs and other invertebrates are well represented in addition to birds. It is hoped that the area may form one only of a series of reserves to be established within the British Isles.

The Variations of European Glaciers.—In the *Annales de Glaciologie* for September 1912 there appears the usual annual report on the condition of the glaciers of Europe, the report referring to the year 1911. In the Alps it is noticeable that the continuously warm and sunny summer of that year led to a marked decrease in the case of the majority of the glaciers. In the Swiss Alps in the preceding years although the majority of the glaciers were certainly retreating, yet certain glaciers, numbering eight in 1910, showed signs of advance, and two, one being the Lower Grindelwald, had been advancing for three years in succession. All these eight, however, responded to the summer of 1911 by distinct retreat, and of all the Swiss glaciers examined, three only showed an advance during 1911. Similar marked retreat showed itself in the other parts of the Alps. On the other hand, of the five glaciers studied in Sweden four showed advance, an advance which in some cases at least has been going on for some years. In Norway the conditions are very variable, both advance and retreat having taken place among the numerous glaciers measured. On the whole, however, retreat was best marked here.

Glacial Overdeepening in the Canton Ticino.—We have received a pamphlet with this title, by Dr. Hermann Lautensach, which forms one of the *Geographische Abhandlungen* of the University of Berlin. In his preface the author points out that Penck and Brückner's great work, *Die Alpen im Eiszeitalter*, covered such an extent of ground, and dealt with so many aspects of the Ice Age, that necessarily the treatment of some phenomena and of particular regions had to be summary. Since the completion of that memoir, also, a considerable number of criticisms of particular points have appeared. The author, therefore, believed that it would be profitable to undertake a detailed examination of a limited area, and investigate the problem of how far the appearances presented there could be explained on the view of glacial action adopted by Professors Penck and Brückner, and to what extent, if at all, on the hypotheses supported by others. In this pamphlet, therefore, he devotes himself to a particular problem, that of glacial overdeepening, and to a particular area. As to his general results we can only say here that his observations, in his opinion, support the views put forth in *Die Alpen im Eiszeitalter*, and are inexplicable on any other hypothesis. In the descriptive part of his paper the most interesting sections seem to us to relate to the great alpine passes, several of which of course lie

within the region investigated. As an example we select the account of the San Bernardino Pass, which, it will be remembered, brings the traveller from Thusis and Splugen down to Mesocco and so to Bellinzona and Lugano. The pass is markedly asymmetrical. A very steep rise, traversed by the carriage road in great windings, leads up from the valley of the Hinterrhein to the broad, open, gently-sloping pass with its lake. From this summit a less steep slope leads southward, this showing a sudden steepening above and near the village of San Bernardino. The author explains these relations as follows:—Prior to the Ice Age, owing to the nature of the rock, there was a comparatively low watershed in the region of the present pass. At the maximum glaciation the Hinterrhein valley was filled so high with ice that part of this ice flowed ("transflowed") over the watershed and found its way into the Mesocco valley. This distributary eroded the summit of the old watershed, and produced the present broad open pass. Meantime the far larger mass of ice in the Hinterrhein valley was overdeepening its own valley, its eroding force being much greater than that of the small distributary. Hence the pass was undercut, and the very steep slope on its northern side produced. The sudden change of slope on the south side was produced by the confluence with the distributary of small glaciers from the side walls of the Mesocco valley, the consequent sudden increase in the amount of ice giving increased erosive power. Thus, Dr. Lautensach says, the two gigantic steps which bound the San Bernardino Pass are due the one (the northern) to the *transfluence*, the other (the southern) to the *confluence* of Ice Age glaciers.

The Course of the Upper Danube.—M. Ernest Fleury contributes to a recent issue of *La Géographie* a long note on the evolution of the course of the Danube above Vienna, a subject on which much research has been conducted lately. There is reason to believe that in essence the Danube is a very old river, which once flowed eastward towards the inland sea of Tertiary times, but its present course shows no apparent relation to the relief of the region through which it flows.

The first point of interest is in connection with the source. According to most geographers this is to be sought in the confluence of the two streamlets called Brigach and Breg, which descend from the flanks of the Black Forest in the Grand Duchy of Baden, and at Donaueschingen unite with a spring regarded by some as the true source. Afterwards the stream so formed flows south-eastward towards the basin of Rhine and the lake of Constance, till, at Gutmadingen, it takes a sharp turn to the north-east. All this part of the course is through the calcareous beds of the Swabian Jura, and, especially near Immendingen, part of the water flows into sinks and rifts. By means of colouring matter it has been shown that this subterranean water reaches the Rhine basin. As the basin of the Danube is here placed at a higher level than that of the lake of Constance there is every reason to expect that this leakage of Danube water will increase, and indeed, in 1876, several sinks near Immendingen enlarged suddenly, and led to a considerable loss of water, a loss which the manufacturers using the power tried to pre-

vent by blocking-up the openings. Suess thinks that ultimately the whole of the Danube above Tuttlingen will probably be captured by the Rhine, and, as it is known that further down, near Friedlingen and Beuron, infiltered water reappears in the channel of the river, he thinks that the sources of the Danube should really be placed in Wurtemburg.

Below the gorge of Sigmaringen the river emerges on a wide depressed area, but here the glacial deposits, which are spread out on the Bavarian plain like a huge alluvial fan, drive the stream northwards in a great curve against the Franconian and Swabian Jura. In this depressed area there are many indications of changes in the river's course, fragments of dry valleys and of deserted meanders being obvious. Fixed westwards by the channel which it has cut through the Jura, and eastwards by the similar channel cut through the massif of Bohemia, in the intervening plain the river has swayed to and fro in response to conditions which have now largely disappeared or are disappearing. Part of the plain was once a plateau, some 1600 feet high, and it was the existence of this which enabled the river to cut through the hard rocks of Bohemia to the east.

The present northerly position of the river on the Bavarian plain, however, is a consequence of the above-mentioned glacial deposits of the plain. But it is possible to show that older channels still exist nearer the edge of the Jura than the present one, so that the Danube here has been creeping south within recent geological time. It is probable that this tendency will continue, in spite of man's efforts to prevent it.

Asia.

The Plants, Animals and Minerals of the Bible.—An exhibition to illustrate the plants, animals and minerals mentioned in the Bible has been arranged at the British Museum (Natural History) at South Kensington, and the trustees have had printed an interesting *Guide* to this collection which contains some facts of considerable geographical interest. We note one or two of the more striking points. It is pointed out that the common fowl is not mentioned in the Old Testament and that it was probably introduced into Palestine after the Roman Conquest. The "unicorn" of the Old Testament is stated to have probably been the Syrian aurochs, which is known from Assyrian sculptures to have been living in Asia Minor in Biblical times. The common assertion that behemoth was the hippopotamus appears to be negatived by the fact that there is no record of the species in Syria or Palestine in historical time. Some interesting notes are also given in regard to the cereals. Wheat was sown in November or December and was reaped in May, while barley came to maturity nearly a month earlier and was usually got in at the end of Passover. The "tares" of the parable are darnel grasses, whose seeds are poisonous. The "rose" of our translation is probably the narcissus, while the "lily" is the poppy anemone (*A. coronaria*) of our gardens—a very curious inversion of the facts!

Australasia.

The John M'Douall Stuart Transcontinental Expedition, 1861-62.—The South Australian Branch of the Royal Geographical Society of Australasia has sent to the Society a copy in bronze of a Gold Medal presented by citizens of Adelaide, in July last, to Messrs. W. P. Auld, S. King, J. W. Billiatt, H. Nash, and J. McGorrery, the then surviving members of the above expedition, which returned fifty years ago.

Commercial Geography.

A Desert Rubber Plant.—Professor F. E. Lloyd gives, in the *Popular Scientific Monthly*, an interesting account of a composite plant called guayule, which grows in desert regions in Mexico, and is being used as a commercial source of rubber. The plant, whose scientific name is not given, is a low greenish-grey shrub found within the Chihuahuan desert, in the State of Zacatecas, Mexico. It has a very limited geographical distribution, and though it extends into Texas, grows there only in small amounts, and does not attain a large size. Both the plant itself and two allied forms, *Parthenium incanum* and *P. hysterophorus*, are used by the Mexicans as a source of rubber for balls, the bark of the plant being assiduously chewed and the rubber thus obtained in pellets. The ancient Mexicans also seem to have used guayule for this purpose. The rubber does not occur as latex in special vessels, but in minute droplets in the cells of the plant, hence the necessity for the process of mastication to rupture the cells and liberate the minute particles. In consequence of this method of occurrence tapping cannot be practised, and in the process of manufacture it is necessary first to tear the plant into fragments, and then grind these fragments finely in pebble mills with flints and water, by which means the rubber is expressed.

In consequence, the method of collection consists in pulling up the whole plant and conveying it to the mills in bales. As it grows naturally in rocky and desert places, far from water and supplies, the collecting is done by peons with mules. The loads are brought to a central camp, from which they are conveyed by wagon to the nearest railway station. In the first instance, the plants were, as suggested, simply pulled up, root and all, as the easiest method. This is obviously "robber economy" in its worst form, and as the plant, like desert plants in general, is very slow-growing, an industry based on such methods must have a very short existence. It is now found that if the plant be cut off near the ground, instead of being pulled up, reproduction takes place by shoots growing up from the lateral roots, as happens for instance in the lilac of gardens. Attempts are also being made to cultivate the plant, as it thrives in localities otherwise useless. A curious point which emerges from these experiments is that on irrigated land growth is much more rapid than in the wild state, but the rubber content of the plants is also much smaller. Though, however, the net rubber content of the tissues is small, yet the amount of tissue produced within a given time is so much

greater than in the case of the wild plant, that the actual amount of rubber produced would seem to be nearly equal. As yet the cultivation experiments have not been carried on on a sufficiently large scale to render it possible to draw conclusions as to its profitableness or otherwise.

Sugar-Cane in Hawaii.—In vol. xxviii. p. 486 we discussed here the relative production of cane and beet-sugar, showing how cane-sugar is recovering lost ground. In a recent issue of the *Revue Générale des Sciences* Professor Henri Jumelle describes some of the new methods in use in the cane-sugar industry in Hawaii, and his article affords an interesting commentary on the figures previously given, by showing how it is that this industry is progressing. In Hawaii attention has been directed to two separate problems, methods of increasing the production of raw-sugar by better methods of extraction, and methods of increasing the yield of cane per acre, by attention to deep cultivation, manuring and irrigation. Owing to the success of the diffusion method with beet-sugar, it was suggested that this method should be applied to the cane. It has, however, many disadvantages in hot countries: it demands much skilled labour, much costly fuel, and yields a waste (bagasse) so watery that it burns badly. Latterly, therefore, attempts have been made rather to improve the crushing machinery, for the crushing method has not these disadvantages and yields a bagasse which burns readily. The attempts have been crowned with such success that with the newest machinery the yield of crude sugar has been raised from about 75 per cent. of that in the cane to 98·43 per cent.

No less successful have been the results obtained by steam-ploughing. With the elaborate machinery now used in Hawaii it is possible to cultivate the soil to a depth greater than two feet, as against about ten inches before. The result, in combination with improved methods of manuring, has been extraordinary. It is recorded that crops of 272 metric tons per hectare ($2\frac{1}{4}$ acres) have been obtained, a yield some four times greater than that previously obtained. Indeed it is stated that in Réunion a yield of only 40 metric tons per hectare is usually reckoned on. Professor Jumelle points out that if such improvements can be effected with sugar-cane it is probable that such crops as rice and cotton would also respond to scientific methods by a largely increased yield.

General.

Origin and Reclamation of Sand-dune Areas.—Two recent publications of some size deal with the subject of sand-dunes. One, an official *Report on the Dune-areas of New Zealand, their Geology, Botany, and Reclamation*, by L. Cockayne, is essentially practical in nature, while the other—Dr. Gustav Braun's *Entwicklungsgeschichte Studien an Europaeischen Flachlandskusten und ihren Dunen*, published by the Geographische Institut of Berlin, is a purely scientific study of the problem, and includes an attempt to apply the American developmental terminology to this particular kind of land form.

Dr. Cockayne points out that, while sand-dune areas occasionally occur in the interior of New Zealand, these are of most importance along the coast. In the North Island it is estimated that they cover an area of about 290,000 acres, and in the South Island about 24,000 acres. Their tendency to spread and overwhelm fertile land has been recognised, and the Department of Lands and Survey commissioned Dr. Cockayne in 1908 to make a thorough study of the subject. The present is the second report issued, and is especially full in regard to the question of reclamation. The paper is illustrated by a number of striking photographs, which give a good idea of the dune areas. In connection with methods of reclamation it is of interest to note that the marram grass, so widely distributed in the Northern Hemisphere generally, including Great Britain, is regarded as the most useful plant for this purpose, though the tree lupin of California, commonly grown in gardens here, is useful under certain conditions.

Dr. Braun describes in detail many of the dune coasts of Europe, including the German Baltic coast, and those of Gascony, Portugal, Languedoc, Catalonia, etc., and then discusses the origin of shores generally, noting the parts played respectively by the sea and rivers, with a special consideration of the characters, conditions of formation, etc., of dunes. His paper is thus of a much more general nature. It also contains some good illustrations.

EDUCATIONAL.

We have been furnished by Mr. T. S. Muir with the following particulars in regard to the recently-formed Association of Scottish Teachers of Geography :—

A meeting of those interested in the teaching of geography was held in the Society's Rooms, Synod Hall, Edinburgh, on December 7 last. The attendance was representative of several parts of Scotland. Mr. Geo. G. Chisholm occupied the chair. After full discussion the proposed Constitution as approved by the Council of the Society was unanimously adopted, and office-bearers and a committee were appointed.

Constitution.

1. This association shall be composed of those interested in the teaching of geography in Scotland, and its objects shall be to provide a means of discussing such problems as may arise in connection with the status of the subject, and generally to promote the teaching of geography on modern lines.

2. This association shall be under the auspices and shall form a section of the Royal Scottish Geographical Society.

3. All members and associates of the Royal Scottish Geographical Society who are engaged in or connected with the teaching of geography

shall be eligible for membership of this association without further subscription.

4. The subscription for those who are not members or associates of the Royal Scottish Geographical Society shall be 2s. 6d. per annum, payable to the Royal Scottish Geographical Society.

5. The office-bearers shall consist of a chairman, two vice-chairmen, and an honorary secretary. These, and five other elected members shall form the committee, three to be a quorum.

6. A general meeting for the election of office-bearers and committee and any other competent business shall be held each year not later than November 15. Other meetings shall be called at the discretion of the committee. The meetings shall be held in the rooms of the Royal Scottish Geographical Society, Edinburgh.

7. All resolutions passed at meetings of the association shall be laid before the Council of the Royal Scottish Geographical Society.

OFFICE-BEARERS FOR 1912-1913.

Chairman . . Mr. Geo. G. Chisholm.

Vice-Chairmen. . { Mr. J. Cossar, Training College, Glasgow. Mr. F. Spence, Training College, Edinburgh.

Hon. Secretary . Mr. T. S. Muir, Royal High School, Edinburgh.

Committee.—Mr. Findlay, George Watson's College, Edinburgh; Mr. Macgregor, Boroughmuir H. G. School, Edinburgh: Mr. Corrie, Kirkcaldy; Mr. Philip, Aberdeen; and Mr. Wilson, Dollar.

All teachers of geography in Scotland who are members or associates of the Royal Scottish Geographical Society are earnestly requested to send in their adhesion to the new association without delay. They are also expected to do their utmost to secure recruits so that the association may be thoroughly representative. It is hoped to hold a meeting early in 1913 when a paper dealing with methods of teaching geography will be read. Should a sufficient number of members join from any well-defined district local branches will be started.

NEW BOOKS.

EUROPE.

Celtic Place-Names in Aberdeenshire. With a Vocabulary of Gaelic Words not in Dictionaries. The Meaning and Etymology of the Gaelic Names of Places in Aberdeenshire. Written for the Committee of the Carnegie Trust. By JOHN MILNE, M.A., LL.D. Aberdeen: *Daily Journal* Office, 1912.

Gaelic Place-Names of the Lothians. By JOHN MILNE, M.A., LL.D. London: M'Dougall's Educational Co., 1912.

These are two exceedingly interesting books, containing many facts of great importance to the geographer. Dr. Milne points out that the process of corrupting the often highly appropriate Gaelic place-names—a process which has been going

on for a prolonged period—has been greatly accelerated by the publication of the Ordnance Survey Sheets. Names on the sheets have been applied to a particular feature when another was meant; they have been taken down wrongly and then ingeniously corrected by persons at a distance: they have been doctored and improved and modified in a hundred ways till the original meaning has often quite disappeared in the printed form. This is a disadvantage, not only from the point of view of poetry and beauty, but also because the true names often throw a flood of light on vanished conditions of life. Real though these disadvantages are, however, we fear the process cannot be stopped. The old tongue with all its beauties is disappearing, and we doubt if, for example, the Scot of to-day can be persuaded to abandon the convenient, if foolish, *Gateside* for the appropriate but unfamiliar *Goathach Suidhe*, windy place. If, however, his tongue prefers the familiar, he can nevertheless scarcely fail to be interested in the interpretations which Dr. Milne offers. Who that has descended from Lochnagar and found The Ladder far less formidable than the name suggests will not be interested to know that it is An Leitir, the hillside? Curious also is the story of Beinn Iutharn Bheag and Beinn Iutharn Mhor, little and big mountain of hell, an ingenious Ordnance Survey rendering of Ben Uarn, the phonetic spelling of Ben Bhearn, mountain of the gap, because of the gap between the two mountains. The two books are full of such curious facts, and may be cordially recommended to the geographer.

Rome, the Cradle of Western Civilisation: as Illustrated by Existing Monuments. By H. T. Inman, M.A. London: Edward Stanford, 1912. *Price* 1*s. net.*

This is a guide-book upon a somewhat new plan, an attempt being made to classify the monuments of Rome according to the time of their construction, and thus show by a continuous narrative the debt of the western world to Rome. The idea is doubtless good enough, but there are certain practical difficulties in carrying out the author's scheme. For example, the Mausoleum of Hadrian is described on p. 56 under the heading of The Campus Martius and Neighbourhood, while the fact that it is enclosed within the Castle of St. Angelo is not mentioned till p. 287, under the heading of Art Collections. Again, the tourist who, trusting in the author's classification, sets out to see a fourth-century church in Santa Maria Maggiore will, we fancy, get something of a shock when its façade opens before him. Nor can we quite see the logic of placing the very curious lower church of San Clemente under the twelfth century. In fact, as reverence for the buildings of a past epoch was never a Roman characteristic, we think the attempt to classify the monuments in the author's fashion is a task of very great difficulty. If, however, the book can hardly be recommended to the tourist visiting Rome for the first time, those already familiar with the objects of interest will doubtless find it very useful.

Les Alpes de Provence: Guide du Touriste, du Naturaliste et de l'Archéologue. Par Gustave Tardieu. Paris: Masson et Cie, 1912. *Prix* 4*fr.* 50.

This is another of the series of guides which are being published under the general editorship of Professor Marcellin Boule, and are remarkable for the amount of space given to various branches of science as illustrated in the different regions considered. The first part in this volume consists of a monograph on the Alps of Provence, the geological structure, topography, climate, flora and fauna, archæology, and generally the conditions of existence as they affect human life, being all carefully studied. This is followed by a second part, giving suggested itiner-

aries, and the whole is illustrated by some striking views. The book may be recommended to the notice of those contemplating a visit to a region not so well known as it ought to be.

Norway, Sweden, and Denmark, with Excursions to Iceland and Spitsbergen. Handbook for Travellers. By Karl Baedeker. Tenth Edition. Revised and Augmented. Leipzig: Karl Baedeker. *Price* 8*s. net.*

The publication of this new edition speaks to the increasing popularity of Scandinavia and the neighbouring regions with tourists. Among the additions are several new maps, notably one of the Lofoten Islands, and an instructive one of the Jostedalsbræ, the largest glacier in Europe.

Russia. By Sir Donald Mackenzie Wallace, K.C.I.E., K.C.V.O. Revised and enlarged edition. With Maps. London: Cassell and Co., 1912. *Price* 12*s.* 6*d. net.*

In vol. xxi. p. 504, we published a long review of the second edition of Sir Donald Wallace's *Russia.* That volume was a revised, supplemented and rearranged version of a book originally published in 1877. Thus while a period of eighteen years intervened between the publication of the first and second editions there is only seven years between the issue of the second and third. Necessarily therefore the alterations have been of a less elaborate nature than before, and deal chiefly with the history of the Dumas and other recent events. In other respects also, however, the volume has been brought up to date, and remains a treasure-house of facts in regard to the great Russian empire.

Rambles in Ireland. By Robert Lynd. London: Mills and Boon, 1912. *Price* 6*s.*

Mr. Lynd takes us here and there through Ireland in a delightfully unpremeditated fashion. We start in Galway of the Races, but come in our rambling to spots so different as Cashel of the Kings, and we find an account of an evening in Lisdoonvarna among priests at play, along with legends of Oisin and of many another hero who trod the soil of Erin in times past. We are also given the opportunity—though the book is not a professed study of Irish character and problems—of understanding a little better what manner of man the Irishman at home really is, for the book is full of anecdotes of Irish life in the various parts of the country.

The illustrations consist of a series of fine photographs and some coloured drawings by Mr. J. B. Yeats.

The Guadalquivir. By Paul Gwynne. London: Constable and Co., Ltd., 1912. *Price* 7*s.* 6*d. net.*

This is a delightful book to take up on a lazy, idle day. It contains a pleasantly written, if somewhat garrulous description of the country on each side of the Guadalquivir from its source to the sea, with more detailed and very interesting disquisitions on the two famous cities of Cordova and Seville. The author knows Andalusia well, and writes with generous enthusiasm of its former glories and its present attractions. He has something to tell us of the geology and ethnography of the tract; he makes skilful use of its brilliant history in the halcyon days of the Romans and the Moors; and he is a sturdy champion of Andalusian music, painting and art. He is at his best, however, in his amusing

and shrewd delineations of the present inhabitants, which he successfully illustrates in many good anecdotes. He is not forgetful of, though he does not dwell upon, the economic conditions of Andalusia, and he inveighs against the excessive taxation and general mismanagement of the Government. We may add a word of commendation of the illustrations, a dozen of which are coloured.

My Parisian Year: A Woman's Point of View. By Maude Annesley. With 20 Illustrations. London: Mills and Boon, Ltd., 1912. *Price* 10*s.* 6*d. net.*

Paris is the city inexhaustible. It will bear any amount of "writing up." In adding another to the many books about it Miss Annesley need not fear being accused of vain repetition, for, though she does not tell us much that is new, she has a light, happy touch, and her point of view is unhackneyed. As a resident in Paris she simply relates her experiences, not, indeed, in chronological order, but beginning with the more obvious and concluding with the more intimate features. We view the Parisians as they are, with all their faults and virtues, in a series of moving word pictures as vivid as they are truly realistic. We have only one complaint to make, and that is that in the chapter on "Money" the author does not refer to the absolutely scandalous way in which false coins are "planted" upon the unfortunate tourist. The result is that every one scrutinises his change in a manner which would give intolerable offence in this country.

The Building of the Alps. By T. G. Bonney, Sc.D., F.R.S., etc. etc. With 48 Illustrations. London and Leipsic: T. Fisher Unwin, 1912. *Price* 12*s.* 6*d. net.*

Professor Bonney's is a name that has long ranked high in the affections of those who love the Alps, as it takes one back to the heroic days when almost every mountain expedition meant a new ascent, and when the sill of each valley was the threshold of the unknown. The mountaineer will turn with most interest to those concluding chapters in which the reminiscent vein is charmingly exploited, while even the most indefatigable of peak-baggers will examine with admiring envy the appendix in which Professor Bonney's numerous and almost ubiquitous excursions are detailed. The first chapter deals with the geographical distribution of Alpine rocks, and here the nature of the metamorphic rocks is very fully treated. Passing on to the materials of the Alps, their nature and origin, we find considerable space devoted to the age of these gneisses and schists, and Professor Bonney, in opposition to the Lyellian or Uniformitarian School, leans to the opinion that they are Archæan. Chapter III. gives some account of the growth of the Alps, with special reference to flat folds. The next chapter, entitled "Mountain Forms," is remarkable for the easy way in which the author cites examples from all parts of the Alps, the result of personal knowledge attained by perhaps only three others among Anglo-Saxons—Ball, Tuckett, and Coolidge. Chapter V. gives the distribution of snow-fields and glaciers. On page 116 it is stated that the Col de Fenêtre, at the head of the Val de Bagnes, cannot be crossed without traversing a glacier. This is not the case, and indeed it is contradicted on page 123. In Chapters VI, VII. and VIII Professor Bonney re-states his well-known opinions on the erosive power of ice. He declines to admit that glaciers have borne more than a very minor part in carving mountain systems. Only the smallest and loftiest of lake basins have been, in his opinion, excavated by ice. First the sea, as the dome-shaped mass slowly elevated itself, then running water and the ordinary atmospheric agencies have been the main factors in the creation of valleys and the isolation of peaks. Even cirques and steps, he maintains, have been formed chiefly by streams. The larger

lakes, apart from those obviously formed by morainic dams, are due, he thinks, to differential movements in the beds of valleys.

The illustrations, chiefly from photographs, are really illustrative. The Index is curiously unequal, one of the references at least being almost freakish.

Edinburgh. By R. L. Stevenson. With 24 illustrations in colour by James Heron. London: Seeley, Service and Co., 1912. *Price* 12*s.* 6*d. net.*

This is a very handsome edition of Robert Louis Stevenson's well-known book, and will doubtless find many purchasers among his admirers. Printing and get-up are admirable, and Stevenson's melodious prose may be here enjoyed under the most favourable conditions. Some of Mr. Heron's illustrations have come out well, others seem rather to lack definiteness, and display too great uniformity of colour.

The Geology of the Districts of Braemar, Ballater, and Glen Clova (*Explanation of Sheet* 65). *Memoirs of the Geological Survey of Scotland.* By George Barrow, E. H. Cunningham Craig, and L. W. Hinxman. Edinburgh: H.M. Stationery Office, 1912. *Price* 2*s.* 6*d.*

Geographers will be grateful for this interesting Memoir, which deals with a most attractive district, including as it does the Dee Valley, the massif of Lochnagar, and the upper parts of several of the Forfarshire Glens. In addition to the detailed description of the geological map the *Memoir* contains, especially in its first chapter, a great deal of matter of direct geographical importance, the description of the physical features of the region being to our mind excellent. We do not, however, understand why the Dee on the sheet is described as consequent—surely it is subsequent, the Lee, Mark, and North and South Esk being remnants of the original consequents?

ASIA.

Snapshots in India. By John Wear Burton. London: Elliot Stock, 1912. *Price* 5*s. net.*

This volume contains a number of sketches by a missionary whose proper field of work is in Fiji, who made a tour in India to see how missionary work was being carried on there. He "suffered nearly eight thousand miles of weary travelling" in India, and visited between forty and fifty mission stations, and "looked at things with the missionary eye." Remembering this limitation, the reader will enjoy a glance over these *snapshots*, which are pleasantly and even enthusiastically written by one who is evidently most earnest in his zeal for the missionary cause. The book is profusely illustrated with photographs of well-known places and scenes.

The Indian Scene. By J. A. Spender. London: Methuen and Co., Ltd. *Price* 3*s.* 6*d. net.*

This volume is a reprint of the articles contributed to the *Westminster Gazette* by its well-known editor, Mr. Spender, during a brief tour in India at the time of the Coronation Durbar. As might be expected from the writer of the Bagshot papers, the articles deserved and secured a good deal of attention at the time of their publication, and were as popular in India as they were at home. Mr. Spender recognises his own limitations, as practically a novice on Anglo-Indian affairs,

but this does not prevent him from venturing now and again on debatable and contentious matter, on which his observations are always shrewd, incisive, and good-humoured, and not too dogmatic. Usually such articles as we have in this volume do not bear republication, but there are exceptional cases, and this is one of them.

The Chinese. By JOHN STUART THOMSON. London : T. Werner Laurie, 1912. *Price* 12*s.* 6*d. net.*

This is a collection of papers on things Chinese, ranging over a wide field, from the daily life of foreigners to Chinese humour, art, politics, and literature, and the book affords some entertaining reading. Mr. Thomson is an American, and when he essays to give his readers a picture of "the daily life of foreigners in China," he might have said Hongkong in place of China, for his first section, which bears the above heading, treats chiefly of life in our Crown Colony. But any one who judges that life from Mr. Thomson's account would be justified in believing that Hongkong is a very strange and fearsome place for the foreigner to live in, afflicted with a pestilential climate in which the exile from home drags out a precarious and miserable existence. It is, perhaps, not quite fair to assume that the author is wilfully distorting facts, and it may be needless to take him too seriously in his flights of fancy. But Hongkong largely owes its prosperity and its continued existence as a British colony to the energy of Scotsmen, and if the book is to be noticed at all here, it is not possible to refrain from challenging some of the grotesque and extravagant statements in which Mr. Thomson indulges with regard to Hongkong and South China. We take a few instances at random :—

"I never knew a foreigner in Southern Chinese ports who did not languish for nine months of his first two years in sickness." "This British colony takes vitality out of its citizens more than any port of the Orient. Its line of invalids and derelicts who have fallen back for repairs is a long one, and not all of them reach Glasgow, or even Chifu, Yokohama, or Colombo, before the chill ghost-order 'Halt' is all too willingly obeyed for ever." "The band who rove the East find their discoveries as melancholy as did the followers of Camoens' hero Da Gama, to whom 'a grave was the first and awful sight of every shore.' Certainly three quarters of those who adventure, float out on the tide again as dead culls" (*sic*). "The soldiers in the barracks of this garrison post (Hongkong), which is the strongest in the far East, lie all day on their backs and call to the punkah coolies to fan away their curses." In July "the pigs crawl to the gutter and become molten grease from their own and the sun's heat." And so on, *ad nauseam.*

Hongkong can be very unpleasant during the damp heat of early summer, but it is on the whole a very cheery and healthy community, and that most of the above is sheer nonsense, any old Hongkongite can testify. Many of the author's remarks on native life and customs are marred by similar misstatements, which detract a good deal from the value of what would otherwise be a very readable book. The text is illustrated with some good photographs.

China's Revolution. By EDWIN J. DINGLE. London : T. Fisher Unwin, 1912. *Price* 15*s. net.*

That part of the valley of the Yangtsze which stretches from Hankow to Nanking has been the scene of many struggles for the mastery of China, furnishing materials for many red pages in the history of that country. Not the least bloody of these records will be found in the story of the fighting and massacres

which took place from October to December of 1911, when the cities of Hankow, Hanyang, and Wuchang were the scene of the outbreak of the revolution and of the struggle which took place between the revolutionaries and the imperial troops under the command of Yuan Shi Kai. Mr. Dingle, whose book bears the sub-title of "a historical and political record of the civil war," was in Hankow throughout the time of the fighting and the burning of that city by the imperialists, and he claims that as a personal friend of the revolution leader General Li Yuan Hung, and the repository of exclusive information, he is equipped to write of the main doings of the revolution. We have his own word for this, and we can say from a perusal of his book that it contains much which is of value in giving an idea of the beginnings of events which are fraught with wide-reaching possibilities for the future of China and of the world. The chronicle is written in instalments, bearing various dates, and there are not wanting signs of haste in its composition, so much so that it is not always easy to follow the story ; while some of the writer's quotations "from an American daily," or "from a writer in a London journal," do not carry so much weight as they would if the source of authority were more definitely stated. However, after allowing for this, we have in this book a real contribution to the history of the outbreak of a civil war as to which not very much is known by the public in this country.

Mr. Dingle is of opinion that the new-born republic may encounter some of its greatest dangers from the numerous semi-independent aboriginal tribes who inhabit far Western China, and who are not yet animated by any enthusiasm for progress and reform. This is a side of the question which we do not remember to have seen stated elsewhere, but it is of minor importance when compared with the great problem as to what the body of young intellectuals and Chinese educated abroad who are now superseding the old mandarinate will make of the government of the country under republican forms. Mr. Dingle prints some interesting biographical notes concerning some of the leaders, such as Sun Yat Sen, Yuan Shi Kai, Li Yuan Hung, and others, which may help to a solution. That he looks for great things himself may be judged from the following quotation :—

"The Republicans of China, new-born into a life full of highest promise to mankind, now have free way. In them, if they are wise and good, as wise and good we believe them anxious to be, we shall soon see on the horizon of the East a nation whose power will be ultimately predominant on the earth, upon whose integrity will undeniably depend the peace of the world."

Mr. Dingle is a journalist who has recently travelled a great deal in the far interior of China, as is shown in his book, *Across China on Foot*, published about a year ago, and we have no intention of detracting from the value of his latest book when we say that his attitude is mainly that of a journalist.

From the Black Mountain to Waziristan. By Colonel H. C. Wylly, C.B. London : Macmillan and Co., Limited, 1912. *Price* 10*s.* 6*d. net.*

This is a book written by a soldier for soldiers, more especially for the Indian and European troops which are likely to be employed in what are commonly called Frontier punitive expeditions. But it has an interest far beyond that limited circle, and will be welcomed by statesmen, politicians, students of history, geography, and ethnography, and especially by all who have to study and deal with the complicated and delicate problems summed up in the expression, the North-Western Frontier of India. In 1897, Colonel Wylly had to take his regiment, the Sherwood Foresters, to the Tirah expedition, and he found that "few of us knew anything of the wild men against whom we were to fight, or of the equally wild

country in which the operations were to be conducted." Recognising the want of a handy compendium of information on this subject, he has compiled from official and other sources this volume, which contains an account of "the more turbulent of the tribes beyond our Border, the countries they inhabit, and the campaigns which the Indian Government has undertaken against them during the last sixty-five years." Questions have frequently been asked in Parliament and out of it as to whether such expeditions are really necessary or useful. They are abhorred by the Government of India, and it is doubtful if they are popular in the army. To such questions Colonel Wylly's book furnishes a conclusive answer. He shows how the patience and forbearance of the Government of India have been always stretched to the breaking point, ere sanction was given for punitive measures, and that they were never prolonged one day longer than was necessary. Indeed, it would seem that the prompt withdrawal of our troops from the territories of the offending tribes too often gave rise to misunderstandings and doubts of our sincerity, and in a measure contributed to encouraging the offenders to repeat their offence. In the two years before the Mutiny the Mohmands of Pandiali, we are told, perpetrated thirty-six raids having plunder and murder for their objects, and this they did without reprisals, although Sir John Lawrence had urged the Government of India to take punitive measures. Again, between 1884 and 1890 almost every clan of the Orakzais were continually raiding the frontier; "one division committed forty-eight fresh offences in one year." In an appendix to this work Colonel Wylly gives a list of over sixty punitive expeditions which had to be undertaken against offending tribes within the last sixty years, and, considering the provocation, the number is small. The plan of the book is to take the principal tribes, one by one, to set forth the locality where it lives, to describe its character, and to give a brief history of how it has conducted itself in the past, with a more detailed account of any military operations undertaken against it. Colonel Wylly has many of the qualities which we look for in military writers, simplicity of style, brevity compatible with a just sense of proportion, impartiality of judgment, justice to the good qualities of the enemy; and he has made a careful and effective study of the authorities already existing on his subject. The book is completed with an ample supply of useful maps, and should be in every regimental library and military club. But, as we have already observed, it will also be found of much interest to many outside military circles.

In Abor Jungles. By Angus Hamilton, F.R.G.S. London: Eveleigh Nash, 1912. *Price* 18*s. net.*

When we hear of a punitive expedition on the Indian frontier, our minds instinctively turn to the North-Western frontier, where raids and forays by the fanatical Mohmands, Afridis, Orakzais, etc., may be expected with a most unwelcome regularity. This work on the Abor expedition comes to remind us that there is a North-Eastern frontier as well as a North-Western one, on which it is necessary now and again to send out a punitive expedition. The North-Eastern frontier may be described roughly as the frontier between India and Tibet, and owing to a variety of circumstances much less is known of the inhabitants of the tracts along this frontier than of those on the North-West. The Abors, who are the subject-matter of this book, for example, were comparatively unknown until the murder of Mr. Williamson forced them into public notice.

The principal object of the expedition was, of course, punitive, but the interests of science were not forgotten, and so far as geography and ethnography are

concerned the results constitute a substantial addition to our knowledge of the country and the people. The Indian Pundit Krishna had shown long ago that the Tsan-po and the Irrawaddy were different rivers, and his statement had been confirmed by Mr. Needham and Prince Henry of Orleans. But an interesting question remained unanswered as to how the waters of the Tsan-po reached the Brahmaputra in Assam—a descent of well over ten thousand feet. Was it by a magnificent waterfall or by a series of rapids? It will be remembered that Sir Frank Younghusband, at the conclusion of the Lhasa expedition, proposed a mission to investigate the question, but, most unfortunately for the interests of geography, his proposal was disallowed by the Home Government. At the conclusion of the Abor expedition Mr. Bentinck was deputed by General Bower on the same task, but again most unfortunately the mission failed. "Fogs, torrential rains, and deep snows" prevented it getting farther north than Singging. We need not however dilate farther on this subject, as doubtless it will be fully dealt with by Mr. Bentinck in his address to the Society on the geographical results of the expedition, promised for a later period of the session. A second survey party proceeded up the Yamne river and conducted operations as far as Peram, from which place they observed to the north-east a chain of high mountains forming one wall of the valley of the Tsan-po, which mingled its waters with those of the Dihang. They are in reality one river. The survey of the Yamne river was carried out "to a point twelve miles north of its junction with the Dihang, while the valley of the Dihang itself was surveyed for fifteen miles beyond the same junction, and its course sketched in for yet another twenty-five miles. The region had not been visited before by any mission, and it was found with surprise that it differed considerably in character from the country though which the main column had been passing." Other short expeditions were made to Damro, the chief village of the Kadam Abors, who were quite friendly and offered no opposition, and along the Siyon and Shimong rivers. Mr. Hamilton sums up the work of the survey officers thus: "An accurate series of triangulation emanating from the Assam longitudinal series of the great trigonometrical survey of India was carried over the outlying ranges to the latitude of Kebang, terminating in the base Sadup H. S. Namkam H. S. From this series, and an extension of reconnaissance triangulation to the latitude of Simong, several large snow peaks were fixed on what appeared to be the main Himalayan Divide. One of these was the 25,000-foot peak to which reference has already been made. Other peaks were fixed on the watershed between the Dihang and Subansiri rivers, which seems to be a prominent spur of the main water-parting. It was, of course, only possible to obtain a mere approximation of the topography of these snow-ranges; but, none the less, the results which were forthcoming will be of great future value. Three thousand five hundred square miles of country in all were correctly mapped on a scale of four miles to the inch. This area included the whole valley of the Dihang as far north as Singging, the whole of the Yamne valley, the whole of the Shimong valley, and a portion of the Siyon river." So much for the geographical results of the expedition.

Besides these scientific expeditions there were two political ones, the first to ascertain the truth as to the allegations of Chinese aggression in the North-Eastern frontier zone, and this mission returned, having failed to find either Chinese officials or soldiers within the zone. The second mission was to the Miri country to survey the Kamla Subansiri tracts, and according to Mr. Hamilton the mission was given an impossible task owing to the inexperience of the political officer in charge and the insufficiency of the means placed at his disposal by the Assam Government. But presumably Mr. Bentinck will have much to say on this point

also. The ethnographical results of the expedition are not less considerable, but we must refer our readers for details to Mr. Hamilton's exceedingly interesting chapters on life in the Abor jungles. He has used his exceptional opportunities (he was the only war-correspondent with the force) to the best advantage, and has much new and valuable information to give us about the Abors, the Miris, the Mishmis, the Nagas, their subdivisions, relations to adjoining tribes, their laws, religion, customs, methods of warfare, family life, etc. Naturally the greater part of the book is taken up with an account of the inception, progress and results of the punitive expedition, and these are related with the easy grace and literary skill which distinguish Mr. Hamilton's other works, and which we expect from the practised journalist. An excellent map materially assists the reader in following the various military operations, and the book is illustrated by a profusion of good photographs.

AFRICA.

In French Africa. By Miss Betham-Edwards. London: Chapman and Hall, Ltd., 1912. *Price* 10*s.* 6*d. net.*

In this volume Miss Betham-Edwards gives us some bright and crisply-written sketches of ancient history in French Africa, for she tells of travels among conditions which prevailed when Napoleon III. and Eugenie reigned in the Tuileries and MacMahon was Governor of Algiers. The sketches will be enjoyed by tourists and residents in Algiers now, as enabling them to appreciate the great change and improvement effected in Algeria by the French administration, to which reference was made in our notice of M. Victor Piquet's *La Colonisation Française dans L'Afrique du Nord* in this Magazine last September. Miss Betham-Edwards has no exciting adventures to relate, nothing worse than a snow-storm in a cedar forest, but she is an adept at description, and her pictures of the *fête* in honour of the Mahommedan saint Aissaoua, and of the effects of an invasion of locusts, and of an earthquake, are vividly realistic and sympathetic. Indeed sympathy with and admiration of the Arab population are marked features of this book. It is illustrated by a number of good photographs.

Au Pays de Salammbô. Par Martial Douel. Paris: Fontemoing, 1912. *Prix* 3 *fr.* 50.

Since Flaubert visited Tunis and Carthage in 1858, and wrote *Salammbô*, many things have occurred there. M. Rene Cagnat, who writes a Preface to this volume, thinks the French occupation has destroyed much of the charm of the district by introducing railways, villas, hotels, and boulevards, but no one can survey the ruins of Carthage, or inspect the museum containing the antiquities discovered there, without feeling transported to another epoch. M. Douel evidently experienced this when he realised in thought "the sumptuous bustle of the city of Hamilcar, the splendour of its temples, the animation of its public places, and when these came tumultuously to his mind, and he enjoyed the penetrating illusion of reconstructing with Flaubert the proud and savage capital." He was also impressed, as all visitors are, with the enormous subterranean cisterns which furnished the water supply of Carthage, and which Flaubert only saw in ruins, but which were restored about 1862, and now supply the little town of La Goulette instead of the vast Phœnician metropolis.

AUSTRALASIA.

By Flood and Field: Adventures Ashore and Afloat in North Australia. By Alfred Searcy, author of *In Australian Tropics.* London: G. Bell and Sons, Ltd. *Price* 6*s. net.*

Beginning with a shipwreck, a massacre, and residence for some months among savages, the author takes us to Port Darwin, and narrates in a breezy manner his many and varied adventures, first as customs officer, and then as a member of the police. It is a fascinating story of life in Northern Australia, and can be cordially recommended to all those who have not outlived their love of tales of moving accident in flood or field.

GENERAL.

Cities Seen in East and West. By Mrs. Walter Tibbits. London: Hurst and Blackett, Ltd., 1912. *Price* 16*s. net.*

We may confess our belief at once, that this book does not lend itself readily to review in a geographical magazine. The author, a lady of Irish descent, is quite frank about herself. She tells us in as many words that she is "an orthodox Hindu and therefore an idolatress. Mahadev is the Lord and the lingam the idol." She has been "in the Outer Court of practical occultism for many years, and in constant association with high initiates," and she has at least eleven personal friends who are direct pupils of the Mahatmas. The book is divided into two parts, the second of which is presumably the more important as it is intended "for those men and women, forming a belt of fire all round the world, of every colour, creed, and clime, who have known and sickened of all experiences of the outer life and wish for definite knowledge of the World Unseen, but have not yet the power to penetrate it for themselves," and if any of our readers come under this category and have some idle hours to waste, they may read this part for themselves. We may add that, having read it, we find "definite knowledge" conspicuous by its absence. Mrs. Tibbits tells us that to some "it will appear naught but the imaginings of an unbalanced mind," and we are ready to admit that we are of that number. The first part of the book is more intelligible, and is dedicated "to the men and women met in all cities and seas who also have wished for all sensations." It consists for the most part of sketches of cities, a few in Europe and the majority in India, with which Mrs. Tibbits evinces a very peculiar and extensive acquaintance. Each city is ticketed off: Paris, the city of sin; Nice, the city of pleasure; Bombay, the city of destiny; Agra, the city of love, etc. She claims to be a great traveller. "I have," she says, "made eighteen long voyages and innumerable short ones. The tale of my travels must approximate two hundred thousand miles," and apparently she was the confidant and *chère amie* of princesses, duchesses, diplomats, and officials of all ranks in the West, and also in the East with the addition of maharajahs, ranis, gurus, and priests of every grade. She has considerable power of word-painting, and goes off into a rhapsody over a flower or a temple, etc., rather oftener than the ordinary reader cares for. As for her opinions on life in India, their value may be gauged from a quotation: "Simla, with its sordid scheming, its artifices, its made, forced conversation, its sensualism, its pettiness of passion, its social middle-classness, and its political immensities. . . . For the Simla season are required nerves of steel, Spartan self-control, the self-restraint of St. Antony, the patience of Piccadilly, the talents of a Crichton, the tact of Edward VII., the diplomacy of an empress, the courage of despair," and so on. Who of us, who knows Simla, can refrain from a smile at such a farrago of non-

sense? At one place in her book Mrs. Tibbits says: "My experience, in many sorts of investigations, has led me to the conclusion that the world is inclined to be too incredulous." *Cities Seen in East and West* will not improve matters.

A Modern Pilgrim in Mecca. By A. J. B. Wavell, F.R.G.S. London: Constable and Co., Ltd., 1912. *Price* 10*s.* 6*d.*

Apart altogether from the interest which this book arouses, it is quite an achievement to have written it. As the author points out, of the dozen or so Europeans who have been to Mecca, during the past hundred years, only four—of which he himself is one—were Englishmen. There is much to interest the reader in the description of the journey from London to Beyrout, the stay in Damascus, and the journey thence *via* the Hedjaz Railway to Medina. From this point the pilgrimage proper begins, and through many perils the author and his two faithful servants find themselves at last in the stronghold of Islam. One of the servants seems to have been a "lad o' pairts," as on more than one occasion he extricated his master from a difficult situation by declaring that he had uncles in exalted positions in Yemba and Jiddah, whether consanguinean or otherwise is not stated.

Arrived at Mecca we have a graphic account of the various religious performances, much of which is impressive, but much quite the reverse. The author's advice to intending pilgrims is to enter the country in disguise, but one would require to be of a very adventurous nature to attempt the pilgrimage at all.

The latter portion of the book should be of particular interest at the present time, as it gives the author's experiences in the war between the Turks and the Arabs in the Yemen. The chapters on his escape from Sanaa, where he was a prisoner, on his recapture and final release, are quite as exciting as anything of the kind in fiction. We are inclined to doubt the advisability of printing as an appendix the letters which passed between the author and the Foreign Office in regard to his arrest. There are a few interesting illustrations and a useful map.

The Sea-Trader: his Friends and his Enemies. By David Hannay. London and New York: Harper and Brothers, 1912. *Price* 15*s. net.*

Some time ago Mr. Hannay published an acceptable book on the *Royal Navy from 1217 to 1688.* In this substantial volume he has undertaken, and with conspicuous success, a much more formidable task. It is to give an account of the sea-faring man "in normal conditions going upon the sea on his 'lawful occasions,' and in port." The task was one involving much study, much patience, and much erudition, for, as the author points out, most writers expatiate on the romantic and exciting details of adventures and incidents, of which there is notoriously *un embarras de richesse*, and they do not care to take away from the interest of their narratives by prosaic details of commonplace life. And yet these details have an intense interest as throwing light on the conditions in which the trade, commerce and war of the past were carried on, and in which deeds of derring-do were done that changed the course of history and affected the fate of empires. Mr. Hannay has confined himself to what may now be called ancient history, for his work contains only one too brief chapter on the revolutionary changes produced in the nineteenth century by the use of iron in the construction of ships and steam in their propulsion. These were of course the principal factors in the change, but Mr. Hannay adduces others, *e.g.* the break-down of the Navigation Laws and the competition of the United States, on which he has some weighty observations to make. This book must have an intense interest to the "mariners of England" and to the whole English-speaking peoples now scattered all over the world; but

its interest will not be confined to them, for the author has much to say about the conditions of sea-service among the Venetians, Spaniards, Portuguese, French, and Dutch. In passing, we may add that he is scrupulously impartial, and does full justice to the prowess of the sailors and explorers of other countries.

Malta and the Mediterranean Race. By R. N. Bradley. London: T. Fisher Unwin, 1912. *Price* 8*s.* 6*d. net.*

From time to time lately brochures have appeared written by Professor Zammit and Mr. Bradley himself, giving an account of the work of excavation in Malta and the adjacent Gozo. In a sense the present volume is a summing up of the work done to date, and a rendering into popular form of the methods and investigations of Sergi and Angelo Mosso. From discoveries in Crete and other parts it has been known that there existed a pre-Grecian and prehistoric race of high culture which has apparently entirely disappeared. Who were they? Professor Sergi of Rome, pursuing his own method of classifying skulls, deduces that this great race belonged to Neolithic interglacial man, who spread throughout North Africa and the whole of Europe, and were a Hamitic people, "probably fairly represented to-day by the light-skinned Berbers." They comprised the early Egyptians, migrating through Spain as the Iberians, through Sicily and Italy as the Ligurians, and throughout the Mediterranean basin generally. The Empires, he says, of Greece and Rome have disappeared, but have left this old population practically where they stood before. It will be seen how much that is new and controversial there is in all this. There is also a very interesting contribution on the underground dwellings, and their connection with cave dwellings and dolmens.

BOOKS RECEIVED.

Karakoram and Western Himalaya, 1909: An Account of the Expedition of H.R.H. Prince Luigi Amedeo of Savoy, The Duke of the Abruzzi. By Dr. Filippo de Filippi, F.R.G.S., Author of *Ruwenzori.* With a Preface by H.R.H. The Duke of the Abruzzi. Profusely Illustrated with Maps, Panoramas, and Photographs by Vittoria Sella. In 2 vols. Large 4to. Pp. xviii + 470. £3, 3*s. net.* London: Constable and Co., Ltd., 1912.

Greece of the Twentieth Century. By Percy F. Martin, F.R.G.S. Demy 8vo. Pp. 391. *Price* 15*s. net.* London: T. Fisher Unwin, 1912.

The Conquest of New Granada. By Sir Clements Markham, K.C.B., D.Sc. (Cam.). With a Map. Demy 8vo. Pp. xvii + 232. *Price* 6*s. net.* London: Smith, Elder and Co., 1912.

Recent Events and Present Policies in China. By J. O. P. Bland. Illustrated. Royal 4to. Pp. xi + 482. *Price* 16*s. net.* London: William Heinemann, 1912.

The Little World of an Indian District Officer. By. R. Carstairs. Demy 8vo. Pp. ix + 381. *Price* 8*s.* 6*d. net.* London: Macmillan and Co., Ltd., 1912.

The Sea and the Jungle. By H. M. Tomlinson. Demy 8vo. Pp. 354. *Price* 7*s.* 6*d. net.* London: Duckworth and Co., 1912.

Religion und Zauberei auf Bismarck-Archipel. Von P. G. Peekel. Demy 8vo. Pp. iv + 135. *Preis M.* 6. Münster i W.: Aschendorffsche Verlagsbuchhandlung, 1910.

The South Pole: An Account of the Norwegian Antarctic Expedition in the "Fram," 1910-1912. By Roald Amundsen. Translated from the Norwegian by A. G. Chater. With Maps and numerous Illustrations. In 2 vols. Royal 8vo.

Pp. vol. I. xxxv + 392 ; vol. II. x + 449. *Price* £2, 2*s. net.* London : John Murray, 1912.

Geographie des Atlantischen Ozeans. Von Prof. Dr. Gerhard Schott. Mit 1 Titelbild, 28 Tafeln und 93 Textfiguren. 4to. Pp. xii + 330. *Preis M.* 23. Hamburg : C. Boysen, 1912.

Aux Sources du Nil par le Chemin de fer de l'Ouganda. Par Jules Leclercq. Avec 16 gravures hors texte et une carte. Crown 8vo. Pp. v + 302. *Prix* 4 *fr.* Paris : Plon-Nourrit et Cie, 1913.

The True History of the Conquest of New Spain. By Bernal Diaz del Castello, one of its conquerors, from the exact copy made of the Original Manuscript. Edited and Published in Mexico by Genaro Garcia. Translated into English, with Introduction and Notes by Alfred Percival Maudslay, M.A., D.Sc. Vol. IV. Demy 8vo. Pp. xiii + 395. London : Hakluyt Society, 1912.

A History of Geographical Discovery in the Seventeenth and Eighteenth Centuries. By Edward Heawood, M.A. Demy 8vo. Pp. xii + 475. *Price* 12*s.* 6*d. net.* Cambridge : University Press, 1912.

South America : Observations and Impressions. By James Bryce. With Maps. Demy 8vo. Pp. xxiv + 611. *Price* 8*s.* 6*d.* London : Macmillan and Co., Ltd., 1912.

Weather Science. By R. G. K. Lempfert, M.A. Small Crown 8vo. Pp. 94. *Price* 6*d. net.* London : T. C. and E. C. Jack, 1912.

The Structure of the Earth. By F. G. Bonney, Sc.D., F.R.S. Small Crown 8vo. Pp. 94. *Price* 6*d. net.* London : T. C. and E. C. Jack, 1912.

In the Shadow of the Bush. By P. Amaury Talbot. With Illustrations and a Map. Demy 8vo. Pp. xiv + 500. *Price* 18*s. net.* London : William Heinemann, 1912.

The Pagan Tribes of Borneo : A Description of their Physical, Moral and Intellectual Conditions, with some discussion of their Ethnic Relations. By Charles Hose, D.Sc., and William M'Dougall, M.B., F.R.S. Demy 8vo. Pp. vol. I. xvi + 283 ; vol. II. x + 374. *Price* 42*s. net.* London : Macmillan and Co., Ltd., 1912.

The Putumayo : The Devil's Paradise. Travels in the Peruvian Amazon Region, and an Account of the Atrocities committed upon the Indians therein. By W. E. Hardenburg. Edited and with an Introduction by C. Reginald Enock. Demy 8vo. Pp. 347. *Price* 10*s.* 6*d. net.* London : T. Fisher Unwin, 1912.

Lindithgow (Cambridge County Geographies). By T. S. Muir, M.A., F.R.S.G.S. With Maps, Diagrams, and Illustrations. Crown 8vo. Pp. 142. *Price* 1*s.* 6*d.* Cambridge : University Press, 1912.

Ski-Runs in the High Alps. By F. F. Roget, S.A.C. With 25 Illustrations by L. M. Crisp and 6 Maps. Demy 8vo. Pp. 312. *Price* 10*s.* 6*d. net.* London : T. Fisher Unwin, 1913.

Deuxième Expédition Antarctique Française (1908-1910) *commandée par le Dr. Jean Charcot.* Documents Scientifiques. 4 vols. Demy 4to. Paris : Masson et Cie, 1912.

Experimental Researches on the Specific Gravity and the Displacement of some Saline Solutions. By J. Y. Buchanan, M.A., F.R.S. Royal 4to. Pp. 227. *Price* 7*s.* 6*d. net.* Edinburgh : Neill and Co., Ltd., 1912.

Pionieri Italiani in Libia : Relazioni dei Delegati della Società Italiana di Esplorazioni Geografiche e Commerciali di Milano, 1880-1896. Con 140 Illustrazioni e Tavole. Royal 4to. Pp. xi + 403. *Prezzo Lire* 12. Milano : Dottor Francesco Vallardi, 1912.

With the Indians in the Rockies. By James Willard Schultz. Illustrated.

Demy 8vo. Pp. xii + 228. *Price* 4*s.* 6*d. net.* London: Constable and Co., 1912.

The "Wellcome" Photographic Exposure Record and Diary, 1913. Crown 8vo. Pp. 280. *Price* 1*s.* London: Burroughs, Wellcome and Co., 1912.

The Daily Mail Year Book for 1913. Edited by D. Williamson. Crown 8vo. Pp. xxxii + 314. *Price* 6*d.* London: Associated Newspapers, Ltd., 1912.

Die Erklärende Beschreibung der Landformen. Von William Morris Davies. Deutsch bearbeitet von Dr. A. Rühl. Mit 212 Abbildungen und 13 Tafeln. Small Royal 8vo. Pp. xvii + 565. *Preis M.* 11. Leipzig: B. G. Teubner, 1912.

Scottish National Antarctic Expedition: Report on the Scientific Results of the Voyage of S.Y. "Scotia" during the Years 1902, 1903, and 1904, under the Leadership of William S. Bruce, LL.D., F.R.S.E. Vol. VI. Zoology. 4to. Pp. viii + 353. *Price* 30*s.* Edinburgh: The Scottish Oceanographical Laboratory, 1912.

Bismaya, or the Lost City of Adad; A Story of Adventure, of Exploration, and of Excavation among the Ruins of the Oldest of the Buried Cities of Babylonia. By Edgar James Banks, Ph.D. With 174 Illustrations. Demy 8vo. Pp. xxii + 455. *Price* 21*s. net.* New York: G. P. Putnam's Sons, 1912.

Die Portugiesen in Abessinien. Von Kurt Krause. Demy 8vo. Pp. 118. Dresden, 1912.

On the Tracks of the Abor. By Powell Millington. Crown 8vo. Pp. xii + 218. *Price* 3*s.* 6*d. net.* London: Smith, Elder and Co., 1912.

From Pole to Pole: A Book for Young People. By Sven Hedin. Crown 8vo. Pp. xiv + 407. *Price* 7*s.* 6*d. net.* London: Macmillan and Co., Ltd., 1912.

Highways and Byways in Somerset. By Edward Hutton. With Illustrations by Nelly Erichsen. Crown 8vo. Pp. xviii + 419. *Price* 5*s. net.* London: Macmillan and Co., Ltd., 1912.

Village Directory of the Presidency of Bengal, 45 volumes: *North-Western Provinces*, 37 volumes: *Rajputana Circle*, 5 volumes: *Province of Assam*, 7 volumes. *Presented by Dr. James Burgess, C.I.E.*

Postal Directory of the Bombay Circle. Compiled by H. E. M. James, Esq., Bombay C. S. Bombay, 1879. *Presented by Dr. James Burgess, C.I.E.*

Who's Who? 1913. An Annual Biographical Dictionary, with which is incorporated *Men and Women of the Time.* Sixty-Fifth Year of Issue. *Price* 10*s. net.* London: Adam and Charles Black, 1912.

Colonial Import Duties, 1912. *Price* 3*s.* 3*d.* London, 1912.

Foreign Import Duties, 1912. *Price* 4*s.* 10*d.* London, 1912.

Diplomatic and Consular Reports:—

Trade of Valparaiso, 1910-11 (5007); Trade, etc., of Peru, 1910-11 (5008); Trade, etc., of Bosnia-Herzegovina, 1911 (5009); Trade of the Provinces of Seistan and Kain, 1911-12 (5010); Trade of Smyrna, 1911-12 (5011); Trade, etc., of Belgium, 1911-12 (5012); Trade, etc., of Hamburg, 1911 (5013); Trade, etc., of the Vilayet of Trebizond, 1910-11 (5014); Trade of the Adrianople Vilayet, 1911 (5015); Trade of Damascus, 1911 (5016); Trade of Salonica, 1911 (5017); Trade of Norway (Supplementary), 1911 (5018); Finances of the German Empire, 1912 (5019); Trade of Senggora, 1911-12 (5020); Trade and Commerce of Fiume, 1911 (5021); Trade of the Consular District of Riga, 1911 (5002); Trade and Commerce of Uruguay, 1911 (5024); Trade of Santa Marta, 1911 (5025); Trade and Navigation of Port of Dairen, 1911 (5023); Trade via Port Sudan, 1911 (5026).

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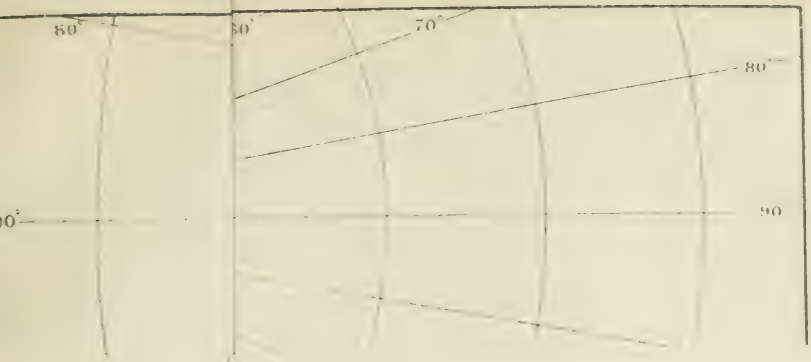
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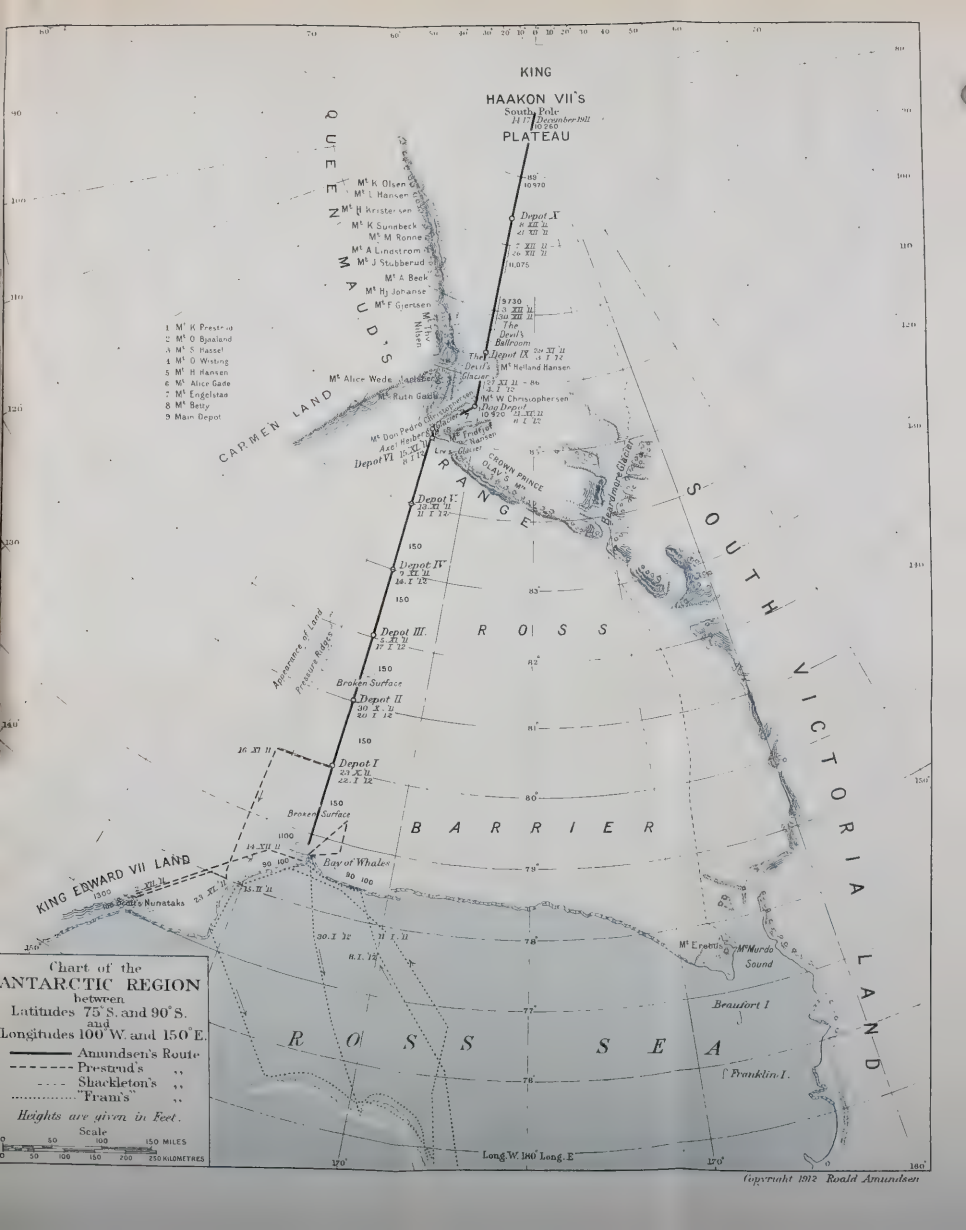

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THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

AHEAD OF CIVILISATION: SOME ASPECTS OF PIONEER WORK IN A NEW STATE.[1]

By Lieutenant-Colonel The Hon. Sir Newton J. Moore, K.C.M.G., J.P., Agent-General for Western Australia.

(*With Illustrations.*)

Last year, when I had the honour of addressing this Society in Aberdeen and Dundee,[2] I attempted to tell you something of the way in which the plan of Empire is filled in, and my remarks to-night may be regarded in the light of a sequel to that discourse. For I wish more particularly to deal in a more or less sketchy way with the main heads of the history of exploration in Western Australia—the chief landmarks on the path of geographical progress, as it were—and to give you some slight impression, founded partly on personal experience, of the life led and work done by the pioneers of civilisation in a new State.

Founded in 1829, the colony of Western Australia, comprising within its area nearly a million square miles of territory, or the equivalent of more than eight United Kingdoms, has produced a history which, if rather barren in economic results for the first sixty years, until the discovery of payable gold, is remarkably rich in exploration records.

Of all the States of Australia, the Western has been by far the most continuous and persistent in carrying on this work of filling in the map of the interior of the great island-continent. Hardly a year passed from 1829 to 1912 in which some one or more expeditions did

[1] An address delivered before the Society in Edinburgh on December 13, 1912.

[2] See this *Magazine*, vol. xxviii. p. 37.

not leave the boundaries of civilisation and settlement to penetrate into the unknown land, and to report fresh discoveries of pastoral land, rivers, mountains, plains, mineral deposits, examples of an ancient flora and fauna, and many curious and interesting features, sometimes productive ones, of a wide and varied Imperial domain.

Many years ago, the Rev. E. Jenison Woods, one of the most celebrated of Australian naturalists, wrote:—"Since the time of its first foundation, Western Australia has never given up the subject of exploration. Unlike the other colonies, which have always gone into the matter by fits and starts, there have always been continuous expeditions from Perth"; and on another occasion, he said:—"The first of the colonies to wake up again to the importance of examining the interior was, as usual, the indefatigable colony of Western Australia." And this activity in land exploration is of a piece with the earlier prominence of the western coast of the continent in maritime investigation, for its exploration by sea began more than 150 years before Captain Cook sailed into Botany Bay, on the eastern coast of Australia, and began his wonderfully accurate charting of that portion of the shore-line of the great island-continent.

The indefatigable Dutch seamen of Batavia were as consistent and continuous in their navigation of our western seas, as were afterwards our own countrymen, many of them Australian-born, in the mapping of that vast hinterland which is even now not completely explored. Perhaps to the uninitiated, to those who read of these matters in books, there is more of an air of romance about the doings of those who go down to the sea in ships, and meet with that great sensation so vividly pictured in Coleridge's *Ancient Mariner*:—

> "We were the first that ever burst
> Into that silent sea."

The adventures of the early navigators circling the world in 20-ton or 50-ton sailing vessels, little cockle-shells as they are often called, appeal more readily to the imagination, especially of an island sea-faring people, than does the greyer life of the bushman who, taking his life in his hand, sets out into an unknown interior, knowing not how he shall fare for water or what human enemies he may meet. But the courage of such men is of the highest order. No sea is so lonely as that great unknown land, where no white man is to be met, and where the blacks are often hostile and seldom, if ever—except those whom you take with you and who are half-civilised—of any assistance.

The ocean, in all its parts, is a great highway of traffic in these days, where you cannot proceed far without meeting somebody, and where it is impossible to hide yourself; even in the earliest times there was always the possibility of meeting other craft, and even in case of shipwreck, so long as you were not drowned, the chance of discovery and return always existed as a hope in the breast. But even at this day in Western or Central Australia, once you leave civilisation behind to proceed into unexplored regions, you have left it definitely, and burnt

your boats. You must rely thereafter on Providence, on expert bush-craft, and on an alert imagination and keen instinct.

So the story of these explorations, great in number and rich in results as they have been in Western Australia, has an indefinable charm to those who have once experienced the fascination of the never-ending blue haze of sombre landscape, the eternal alternation of sun and stars, and the never-varying heavenly dome which in its serenity and clear expanse seems wider and vaster and more magnificent than the homelier and more varying skies of other lands.

Among the long roll of men who did pioneer work of this character in Western Australia are many distinguished names. One of the earliest of our explorers was Captain, afterwards Sir George Grey, known as the great pro-consul, who was sent out from England in 1837 by the Secretary of State for the Colonies, Lord Glenelg, after whom he named the Glenelg River, a large stream running into the Indian Ocean at a point on the extreme north coast.

Grey spent a considerable time in the exploration of a part of the surrounding country, but was eventually driven back by ill-health, reduced stores, mortality among his horses, and the generally unfavourable character of the season. He retired temporarily to the Isle of France, but in the following year did much valuable work in exploring the country between the Williams and Leschenault Rivers, and subsequently that between Shark Bay and Perth, the capital and centre of the Swan River Settlement, which he reached ultimately in 1839. While he did not penetrate very far inland, it may be said that Grey explored a great part of the long coastal stretch from Prince Regent's River to Perth, a distance of some 3000 miles. He discovered and named a number of rivers, mountain chains, and bays, and his reports were of high value and stimulative of further efforts to investigate the conditions of this vast new land.

But although Grey was one of the first he was only one among many, from whom the chief names alone can be selected for mention; these include Edward John Eyre, famous not only as an Australian explorer, but afterwards as a colonial governor; Captain James Stirling, who proclaimed the colony, and was its first administrator; A. C. Gregory; Frank T. Gregory, who from 1857 to 1861 conducted minute investigations of the north-western districts; Sir John Forrest, 1869 to 1883, who first succeeded in making his way from Perth to Adelaide, and explored the route of the trans-continental telegraph line; Mr. Alexander Forrest, Mr. Ernest Giles, and Mr. L. A. Wells, besides many others.

Eyre's journey from Fowler's Bay to Albany in 1841 is regarded as one of the greatest feats of human endurance on record. In an attempt, begun in 1840, to cross overland from Adelaide to Western Australia he had been foiled by want of water, but he sent back the majority of his party, and started out from Fowler's Bay, in South Australia, with one white companion, Baxter, a black boy, and two other natives, determined to reach King George's Sound (Albany) or perish in the undertaking.

One night the two natives murdered Baxter, and escaped with the greater part of the provisions, leaving Eyre and the black boy, Wylie, ill-equipped and provisioned, to complete the journey of some hundreds of miles on foot, and alone. They endured incredible hardships, and, when within about three weeks' march of Albany, fortunately fell in with the French whaler *Mississippi*, whose commander, Captain Rossiter, enabled them by his kind treatment to survive, when they were reduced to the last extremity of hunger, thirst, and fatigue.

The accounts of this arduous journey form a most thrilling narrative and demonstrate, with the history of the fatal expeditions of Leichardt, of Burke and Wills, and at a later date of Wells and Jones, that the annals of Australian exploration are not without their features of tragedy and mystery. But the work of these intrepid pioneers was to draw a few thin lines upon the map rather than to fill it in with ample details. After them follow the surveyor and prospector. The life of these men is simple, and their surroundings are such as to instil into them a spirit of reverence and an imagination which is seldom possessed by the town-dweller.

As I have led this life, some description of it may prove interesting. In the early days of surveying a survey-party would consist usually of the surveyor, his assistant, three or four hands, and a native boy, with perhaps twenty to thirty pack-horses. In later years the "ship of the desert" (the camel) has largely superseded the pack-horse, owing to the fact that in some parts of Western Australia there are long distances between supplies of water, and the camel, as is well known, can go without water for long periods. This animal has thus proved a most useful factor in surveying and prospecting work.

There are now also superior mechanical contrivances for carrying water on these journeys. In the old days any water that was carried was taken in small wooden barrels, but in later years these have been discarded, and perhaps one of the finest contrivances for the carriage of water in the interior has been substituted in the shape of the water-bag. Where camels are used, huge bags, capable of carrying from three to six gallons of water, are swung on either side of the camel, and similar ones are hung on the horses, or are carried by the men.

The life on survey is quite dissimilar to anything one might imagine in a country like this. The horses live on the natural herbage. In some places this is fairly luxuriant: in others, coarse and not particularly nutritious. At night hobbles are put round the forelegs of each horse, and such is the love of company in these animals that they rarely stray more than a mile or two from the camp-fire. Even if they do stray, the black boy, who is a wonderful "tracker," has no difficulty in finding them. As an instance of this remarkable faculty, I may mention that many years ago I had made a rendezvous with a fellow-surveyor at a point some sixty miles from where is now situated the famous town of Coolgardie. I had to go round two sides of a triangle to make this point, and he was to come direct across the hypotenuse, and we were to meet on a certain afternoon approximately at a given point. When within a mile or two of this place each was to signal by firing off

his rifle. On arriving at the meeting-place I fired repeatedly without eliciting any response, and so I made back to water, where I thought my friend might be. But he was not there, so next day I set out to look for him, accompanied by a black boy, who eventually discovered his tracks, and tracked him without the slightest difficulty. He would even stop and pick up a twig to show where my friend had picked his teeth, and with this sure detective we found my friend next day, none the worse for being temporarily "bushed."

In the Kimberley district the aboriginal natives have some customs which are peculiar to themselves, and which are of considerable interest.

Camel teams leaving Carnarvon.

One peculiar fact about them that was noted by Dr. House, the naturalist in Mr. Fred. Brockman's exploration party of 1901, was the complete absence from their weapons of the boomerang or kylie (which is, more than any other implement, always associated with the Australian black); not one being seen amongst the weapons met with.

The most interesting point in regard to these natives is the custom they have of making drawings on suitable faces of rock. These are done in colour—in red, yellow, black, and white; the black (says Dr. House) being charcoal, and the other colours argillaceous earth, specimens of which were found by Mr. Brockman's party wrapped up in paper-bark parcels in deserted native camps. Most of the figures are of human heads, and are better drawn than would be expected from the primitive state in which these people live. Other drawings represent snakes devouring human beings.

That this rude art preceded the advent of the white man is shown by the fact that Sir George Grey discovered similar drawings on the Glenelg River in 1837, although it is singular that the figures have clothes on, making it appear that the natives must at least have seen shipwrecked mariners.

There are other evidences of considerable ingenuity on the part of these natives. According to Dr. House, they make very passable string out of the inner bark of a wattle which grows in abundance. Opossum, kangaroo, and human hair are also used for spinning into string, this being accomplished by rolling it on the thigh with one hand, the string as it is made being wound on a cross with two sticks bound together.

They live largely on fish, and their methods of obtaining this item in their food supply are both interesting and ingenious. As the rivers get low, they travel down from pool to pool. With a coarse grass and wattle-bark they make what looks like an enormous straw bottle, the inside of which they fill with bark obtained from the root of a shrub that grows on the banks of all these rivers, and is known as "Majalla." This straw bottle they then drag backwards and forwards along the pool, with the result that the fish are stupefied, probably by the "Majalla," rise to the surface, and are easily caught.

Besides fish, the natives in these regions use a great number of different edible roots, seeds, nuts, and reptiles as elements in their food supply. Large game they get occasionally, but seldom, and their life is one long nomadic hunt for food. Stones for pounding their food are found in all their camps, and the use of fire is known to them.

The surveyor literally "blazes" the track for the settler and miner, as by his well marked survey lines the prospector is able to make his way through the bush, and the information that is put down on the plans as a result of the surveys is of a most valuable character to the selector who goes out to look for a new home, or the squatter in search of new land on which to locate his station, or the prospector following up a line of mineral country, in the hope of striking minerals in paying quantities.

It is some twenty years ago—I think it was this month—that I was at Coolgardie, in the capacity of a junior surveyor of the Lands Department, and our work was to locate the recent find which had then been made by Arthur Bailey at Coolgardie. With that object in view a tie line was run from what was known as the slate well; and in November we arrived at Coolgardie, and then we were able to demonstrate that this field, which it was anticipated was lying within the concession of the Hampton Plains Syndicate, was twelve miles inside Government land. But I little anticipated when looking at that small hole in the ground, at that time something like eighteen inches deep—they were awaiting the arrival of the survey party, and no development at all had taken place—when I looked at that hole lying underneath a big quartz reef, little did I anticipate that twenty years afterwards I, as representative of the State of Western Australia, would be in a position to say, in this great centre of our Empire, that since that period gold to the value of one hundred and seven millions sterling had been

produced by Western Australia, and that dividends amounting in all to something like twenty-three millions sterling have been paid by the various gold-mining companies operating in Western Australia. The mineral industry has also been the fount and origin of other industries. It has attracted population, the human power which, applied to the slumbering potentialities of our land, has awakened them into productive life.

And so it is that we have now entered upon the second phase or stage of our development as a productive State.

The explorer, the surveyor, the prospector (and these three are really one, all three functions being often combined in the one person)

Miners' Camp near Roebourne, in the West Pilbarra Goldfield.

are still doing their work in filling in the map, but first mineral and pastoral development resulted from their labours, and now we have come to the agricultural and horticultural stage. The precedent condition to all productive expansion is, as you will agree, the attraction of population, and for this the goldfields first acted as the magnet. Between the year 1892, the year of the discovery of Coolgardie, and the year 1906, the population of Western Australia increased from some 58,658 to 255,173 souls, or had more than quadrupled in fourteen years.

Then began a new phase; a return of prosperity visited the Eastern States, and the inflow of surplus population into Western Australia began to decrease; at the same time the expansion of mining became restricted. Manifestly Western Australia had to look for new sources of population and wealth. Of the result, if I speak ever so humbly, I can but speak eloquently, for the facts and figures themselves are eloquent.

Just at this period the people of the State began to turn their attention to agriculture, and the Government, of which I was the head, tried to devise means by which agricultural settlement could be promoted. The first arm of State assistance which we put forth was liberal terms of settlement—probably the most liberal in the British Empire. The second was the construction of agricultural railways by which the settler has been enabled to convey the produce of his land to the markets. From 1906 to the beginning of 1912, about 1000 miles of new railway line were constructed, consisting of extensions into the various new agricultural districts, as well as mining districts, extending from Nannine in the north to Hopetoun in the south, while the agricultural

A load of wool at Carnarvon, the collecting centre of the Gascoyne River district.

railways were practically confined to the south-western division, *i.e.* within a safe rainfall limit as far as agriculture was concerned. According to the Budget speech, which was only delivered a month ago, there are now under construction, or proposed, some 850 miles of line, of which 350 miles will be completed by the end of the current year. When all these new lines, now in contemplation or in course of construction, are completed, the State will own no less than 3450 miles of railways, or an average of one mile of railway for every ninety persons within the State. That, I believe, is a record as far as railway construction is concerned.

The third arm of State assistance is the Government Agricultural Bank, which lends money on approved holdings in sums ranging from £25 to £2000 for improvements, water conservation, stock, farming implements, and other approved purposes.

The success of this policy has been completely demonstrated, and when I say that a total sum of £2,000,000 has been advanced, and that the arrears at the present time only amount to £1000, you will realise that it is a tribute to the business capacity of the manager, as well as a tribute to the fertility of the land on which these advances have been made. Last year the profits made at the bank were some £8000, which brings the present reserves up to something like £35,000.

There are now 7101 accounts current on the books, representing as many customers, and the effect of the policy pursued has been to induce other banks and financial institutions to come into the field for the purpose of lending money on Western Australian agricultural land.

The results of this triple-armed policy of State assistance are apparent. In the strides taken by the wheat industry alone the rate of progress is very remarkable. In 1903, excluding the area cut for hay, there were 92,398 acres under wheat; this year, with the same exclusion, there are 750,000 acres, and from this area a total crop of 9,000,000 bushels—compared with 985,550 bushels in 1903—is expected. In other words where, ten years ago, we reckoned our wheat by the hundred thousand bushels, we reckon it now by the million.

That is the difference which the State policy of immigration, land settlement, railway construction, and financial aid, working on the sound basis of good land and effective human power, has made to Western Australia in wheat growing alone. Nor is this all. While we had only some 6000 acres of land under orchards in 1903, we have now 18,193 acres, and there is further a large annual increase in planting. There are also 2821 acres under vines. We exported in 1911 about 22,000 cases of fruit: this year we exported 65,000 cases; and from the advice that I have there is every possibility that the next year there will be considerably over 100,000 cases; so that for the last three years, so far as fruit is concerned, each succeeding year has doubled the yield of its predecessor. Our apples and grapes bring the highest prices in the market; they are ahead of all others by a considerable percentage, in the London and continental markets; and there is every prospect of an excellent trade opening up in India. To the policy of opening up to agriculture the fertile lands of the south-western district, and irrigating them in the summer season, the Government are now devoting attention, and quite recently a bill has been introduced with a view of giving effect to this policy.

There is a stretch of country 20 million acres in extent in the south-west, with an average assured rainfall of from 30 to 50 inches per annum, which is suitable for fruit-growing, mixed farming, and dairying. On that area the Government, assisted by the best expert advice, are concentrating their efforts at the present time. They have obtained the best possible experts they are able to get in Australia, and are looking forward in the very near future to some very big developments in this part of the State, a portion which, so far as agriculture and mixed farming is concerned, has been neglected to some extent.

It has been found that it was a so much simpler matter to get a prompt return in the far-eastern districts, that most of the new settlers

have gone to the wheat areas; but, with the assistance that is now being offered, the cheaper cost of collecting and other inducements that are held out, we hope, in the very near future, that Western Australia will make a substantial advance not only in the fruit industry, but also in dairying.

The timber and wool industries antedated what I might call the second phase of Western Australia's economic development. But they

Karri (*Eucalyptus diversicolor*) forest in Western Australia. Karri is one of the important timber trees of the region.

have progressed exceedingly under the new conditions. The powerful stimulus of increased population has had its effect upon these great industries. The export of wool has gone up from a value of £443,000 odd in 1903 to over £925,000 last year, and in a more favourable season it rose to over a million sterling. The number of sheep was doubled in the ten years; and cattle and horses have nearly doubled during the same period. The export of timber has risen from about £500,000, a decade ago, to a million sterling annually, and orders are flowing in at the present time to the timber companies.

Twenty thousand emigrants whom we have sent out in about three years have all been absorbed. There is not a trace of them in the general community, and the leading newspaper of the State declares that we want, not only 10,000 a year, but 20,000 a year, and we can absorb them to our advantage and to theirs.

An evidence of the great progress of the State in recent years is supplied by the figures of imports indented from the United Kingdom by the Government alone.

It just gives some slight index when I say that while in 1908-9 the value of the Government indents was £120,000, in the year 1911-12 it has gone up to considerably over £530,000, or more than four times the sum in the former year. At the present time our indents amount to something like just under three-quarters of a million.

This is but one evidence of the great expansion in trade and industry that is taking place ; and when I tell you that in a little community of just 300,000 souls, the total trade amounts to £19,727,292, made up of exports £10,443,570, imports £9,283,722, you will get some idea of the trade of Western Australia. That brings the average up, *per capita*, to no less a sum than £65, 5s. 3d.

Now, I have given you all this information about the second stage of productive development, partly because it is all part of our pioneer work, and partly because it is the direct result of exploration and discovery. The explorers who first went out with horses, then those with camels, and then the prospector, have, by their patient heroic work, prepared the way for the miner and the farmer.

It is a fact which will stand examining, that, had there been no explorer there would have been no farmer in Western Australia, and had there been no farmer, there would have been no trader, so that the great Dominion's trade with the United Kingdom, which is growing year by year, is the direct outcome of the work of the explorer. Thus it is that the science and labour of the geographer make empires in fact as well as in name, and that this restless desire which possesses the British people to penetrate unknown regions is the true source of their Imperial greatness.

A GEOGRAPHICAL DESCRIPTION OF FIFE, KINROSS AND CLACKMANNAN.[1]

By Laurance J. Saunders.

(With Sketch-Maps.)

I.—Physical Characteristics.

Position.—One of the most important features of the Scottish Lowlands is the ridge of harder rock which crosses it under various names from sea to sea. This runs north-east and south-west parallel to the crests of

[1] This essay was awarded the Silver Medal offered by the Council for competition among the students of geography at Edinburgh University during 1912.

the Grampians and the Southern Uplands, and so divides the Lowlands into two valleys. Between them communication is ensured by three important breaks in the dividing line. The Clyde draining to the south-west through a transverse valley from the Southern Uplands, gains the sea between the Renfrewshire heights and the Lennox Hills. The Teith flows south-eastwards from the highlands of West Perthshire in another transverse valley parallel to the Clyde, and then, joining the Forth near Stirling, separates the northern spurs of the Campsie Fells from the south-western extremities of the Ochil Hills. Below Stirling this river widens out into a firth which, through taking its name from the Forth, lies in a line with the Teith in its narrow enclosed upper basin. At Queensferry there is a change of direction; and the firth, now very much broader and more open to the influences of the sea, turns and trends to the north-east. The third interruption in the Mid-Lowland range is near Perth, where the Tay breaks seawards between the Ochils and the Sidlaws. Then, like the Teith-Forth, it widens out into a firth which stretches in a north-easterly direction between the eastern prolongation of the Ochils and the Sidlaw Hills. A peninsula is thus formed between the Firth of Tay and the Firth of Forth. Eastwards lies the sea; westwards, the Ochils run from the head of the one firth to the head of the other, and so cut off the peninsula from the rest of Scotland. The interior is occupied by the three counties of Fife, Kinross and Clackmannan.

Shape and Build.—Since this peninsula is marked out by parallel and transverse elevations and depressions, it is rhomboidal in shape, and lies with its longer and parallel sides running north-east and south-west. The northern of these longer lines is formed by the Ochils, which stretch from within a few miles of Stirling on the Forth in a north-easterly direction for thirty miles, meeting the Tay near Newburgh, eight miles below Perth. This line is prolonged in the same direction for twenty miles along the south shore of the Firth of Tay to where the Tay enters the North Sea at Tents Muir Point. Thence the eastern side of the rhomboid runs to Fife Ness, but the regularity of the coastline is here broken by the wide sweep of St. Andrews Bay, which adds ten to the fourteen miles of straight line from point to point. Fife Ness is the easternmost projection of the peninsula (56° 16′ N., 2° 25′ W.), and from it the coastline of the Firth of Forth runs south-west to the southern apex at Ferryhill. This line, roughly parallel to the Ochils, is cut into by the semi-circle of Largo Bay ($6\frac{5}{8}$ by $2\frac{1}{4}$ miles) which brings the length of the stretch of coast up to 55 miles. From Ferryhill to where the Forth almost washes the base of the Ochils near Stirling, the northern shore of the upper firth completes the rhomboid. The key to the elevation of the interior is the circular area of lowland lying round Loch Leven in the centre of the peninsula. Thence radiate three lowland strips separated the one from the other by uplands which occasionally rise above a thousand feet. To the north-east the valley of the Eden opens on to St. Andrews Bay; to the east, the valley of the Leven from Loch Leven opens on to Largo Bay; to the south-west the valley of the Lower Devon opens on to

the head of the Upper Firth. All along the northern side of the depression formed by the Devon valley, the plain of Kinross and Stratheden, are the Ochil Hills and their eastern continuations, forming a natural boundary from firth to firth, to which the county marches approximate. Then between the Eden and the Leven rise the Lomonds and the highlands of the East Neuk running eastwards to end in Fife Ness. To the south of the pit of Loch Leven, and filling in the area between the Leven and the Devon, is another elevated region, its highest peaks, well over a thousand feet, bearing the names of the Cleish and Saline Hills.

The Ochils.—Among these features the oldest rocks are to be found in the Ochil system, which is composed of underlying andesites, igneous rocks of the Lower Old Red Sandstone Age, associated in some places with beds of sandstone and argillaceous shale. Over these sedimentary strata are poured the lavas of the Upper Old Red, which stretch along the entire system, highest in the west and sinking to low heights near Tayport in the east.

In the west the Ochils rise steeply above the gorges cut by the Allan Water while making its way southward along their flanks to join the Forth near Stirling. Thence the ground mounts to Blairdennon Hill (2027 feet), from which flow the headwaters of the Allan and the Devon, the former at first due north-east and parallel to its subsequent lower course through Strathallan, the latter eastwards through a longitudinal valley. In the southern of the two parallel ranges into which this valley cuts the Ochils are the highest peaks of the whole Mid-Lowland range, culminating in Bencleuch (2363 feet). Then about six miles in a direct line eastwards from Blairdennon, whence start the two ranges and the valley between, all three are cut by a great transverse which never rises above 900 feet. On entering this transverse the longitudinal valley ceases; the cut crossing the northern range drains to the Earn, and so the Devon finds its way through the southern part of the transverse (Glendevon) to the plain beneath. Ten miles due north-east of Glendevon comes another transverse, dropping to 480 feet. This is formed to the north by the little river Farg, which flows through Glenfarg to join the Earn as it enters the Tay: southwards, the valley opens on to the lowlands near the watershed between the Eden and those streams which flow to Loch Leven. With Glenfarg ends that part of the Ochils which, but for the proximity of the Grampians, might be called mountainous. In the line of twenty miles from Strathallan to Glenfarg, there are no less than five summits over 2000 feet in height, and only one well-marked depression, Glendevon; and even it rises to 900 feet from lowlands well below 500 feet. In addition, the breadth of the hills is on an average ten miles, so that it can easily be understood what an enormous obstacle to communication they form, and how important Glenfarg must become as the first low crossing-place east of Strathallan.

Eastwards of Glenfarg, the Ochils sink in height to under a thousand feet. They now come close to the Tay, leaving little or no level land along the northern coast of the peninsula. Then just where the range

approaches the firth (seven miles from Glenfarg) occurs a third transverse well below 250 feet, dominated to the west by a conspicuous cliff of intrusive andesite. This valley opens southwards on to the part of Stratheden known as the Howe; to the north lies the Firth of Tay, but communication with the river lands to the west is maintained by a narrow strip of lowland running close to the river along the northern base of the Ochils. In the centre of this low transverse lies the small Loch of Lindores, whence another longitudinal valley runs eastwards again, dividing the hills into two parallel ranges. The northern range rises to over 900 feet in Normans Law, then sinks to wooded heights near Tayport, where it ends above the dunes of Tents Muir. The southern range rises to and terminates in Lucklaw Hill (625 feet), round the base of which the Motray Water carries the drainage of the central valley to the estuary of the Eden.

Stratheden.—To the south of this low prolongation of the Ochils lie the unconformable red-and-yellow sandstones of the Upper Old Red, found far underneath the surface drift of the Eden valley. Southwards they are bounded conformably by the carboniferous systems, the division between the two running in a fairly straight line from near the Eden mouth to Falkland Road Station, thence round the base of the intrusive igneous mass of the Lomonds into the plain of Kinross. Most of this area is occupied by the low-lying plain of the river Eden, which, formed by the junction of several small streams from the Ochils and the Lomonds, reaches the sea after a north-eastward course of 30 miles. Since one of its headwaters comes from the southern prolongation of Glenfarg, communication is thus maintained across the Ochils with the Tay valley and Strathmore, while the opening westwards between the Lomonds and the Ochils to the plain of Kinross is low and easily traversed—in fact only 400 feet high. This upper part of the valley of the Eden is constricted by the hills on either side to a breadth of less than two miles; but, by the north-eastward trend of the Ochils and the curve of the Lomonds, it widens out at Strathmiglo into what may once have been the bed of an old lake, now the Howe o' Fife, four miles broad and triangular in shape. To the north it is bounded by the Ochils, which, becoming broader to the east, again impinge on the Eden at Cupar. Across them the Pass of Lindores opens from the Tay valley just where the Howe is broadest, that is, opposite the southern apex of the triangle. The south-western side is formed by the slopes of the Lomond Hills, which curve to the southern apex, formed by a tongue of lowland running between the Lomonds and the highlands of the East Neuk. This depression, the Pass of Markinch, from a town at its southern extremity, connects the Howe with the river lands of the Leven. Further east the Howe narrows as the hills of the East Neuk press north, until at Cupar the Eden, which has pursued a meandering course over the dead level of the plain, is hemmed in between low spurs from the Ochils and these hills of the East Neuk. Thence to its estuary, six miles eastward, its valley is narrowed to less than two miles in breadth. Three miles below Cupar it receives its most important tributary, the Ceres Burn, which follows a parallel course

north-eastward among the hills of the East Neuk and now cuts abruptly northwards through the famous Dura Den, where it exposes the underlying sandstone with its fossil treasures. The Eden finally reaches the sea through a winding muddy estuary between Tents Muir and the links of St. Andrews.

The Eastern Highlands.—With the exception of a portion of Kinross, the rest of the area to be described is composed of rocks which form a part of the great carboniferous systems of the Scottish rift valley. Eastwards of a line from Elie to St. Andrews lies a triangle of calciferous sandstone, the other two sides being St. Andrews Bay and the Firth of Forth, the eastern apex Fife Ness. From the northern apex an irregular tongue-like area of this same rock projects westward to underlie the basin of the Ceres Burn; otherwise the rest of the East Neuk is occupied by carboniferous limestone. Northwards are the sandstones of the Eden, while to the south a line of fault runs from Largo to near Leslie. In this area of the Neuk volcanic phenomena occur extensively. For example, to the east of Loch Leven rise the isolated Lomond Hills in three great peaks—West Lomond (1713 ft.), White Craigs (1492 ft.) and East Lomond (1471 ft.). The mass is circular in shape, and is formed of soft marls, sandstones, and limestones under a cap of basalt which has intruded through the sedimentary strata and so preserved them. Separated from the Ochils by the valley of the upper Eden, and, westwards, from the volcanic Cleish Hills by the Leven, the Lomonds are connected with the highlands of the East Neuk by a low ridge of carboniferous limestone which forms the depression of Markinch already noted. Eastwards of this the hills spread out intricately to occupy the peninsula between St. Andrews and Largo Bays, but the contours seem to have been determined by two lines of harder dolerite sills which diverge from Clatto Hill in the west. The northern ridge, lying between the Eden and the Ceres Burn, is continued eastwards by Walton Hill (622 ft.) and Ceres Moor. Here the Ceres Burn cuts down to the Eden, but the range reappears on the other side of the stream to terminate near St. Andrews. From Clatto Hill the southern line of heights—an easterly continuation of the volcanic rocks of the Lomonds—forms a broad watershed running eastwards to Kellie Law and Fife Ness, between the tributaries of the Ceres Burn, which drain the central valley, and the small streams which find their way independently to the Firth of Forth. Outwith these lines of high land stands the isolated Largo Law (948 ft.), an intrusive mass of igneous rock which ages of denudation have worn down into the Vesuvius-like cone so conspicuous a feature of the scenery of the coast resorts. These hills of the Neuk are by no means inaccessible; except where they rise above the lowlands of the Eden or where they form such rare irregular cones as Largo Law, they appear as swelling ridges above slightly inclined plateaus which sink to the sea in terraces and form low cliffs or grassy banks between the numerous small creeks from St. Andrews to Kincraig. At this latter point (near Elie) a small igneous intrusion forms a long cliff of a height of 200 feet, almost the only example in Fife of wild rock scenery.

The Leven Basin.—Between the Lomonds and the highlands which fill in the area between Kirkcaldy and the lower Devon, lies the valley of the Leven, comprising two of the four lowlands of the peninsula. The upper area, 400 feet above sea-level and circular in form, centres on Loch Leven (353 ft.). To the north and the north-west rise the Ochils; to the west the Lomonds. Between them a strip of lowland leads to the upper Eden valley, and so low is the watershed between the two systems that the transverse of Glenfarg, drained southwards by a head-water of the Eden, is accessible from Kinross and so connects with the Tay. Another strip of lowland leads west between the Ochils and the Cleish Hills to the Devon valley at Crook o' Devon, thence to the Glendevon transverse or the plains of the Forth. Then to the south of Loch Leven rise the basalt-capped Cleish Hills (Dunglow, 1241 ft.) and Benarty (1131 ft.), between which a depression slightly under 500 feet leads to the upper Ore valley; while between Benarty and the Lomonds the Leven finds its way from the loch through the narrowest gap of all to Largo Bay. Within this broken circle of hills lies the plain of Kinross, made up of the soft sandstones, marls, and conglomerates of the Old Red and so geologically connected with the Eden valley. To the south these rocks dip conformably beneath the harder carboniferous limestones of the hill area. The drainage of this circular depression collects in Loch Leven, whose waters occupy an irregularity of surface left by ice action. Roughly heart-shaped, it lies with its axis pointing north-west and south-east and measures $3\frac{5}{8}$ miles by 2 with an area of 3406 acres—the largest loch of the Lowlands. Numerous sandy islets dot its surface, and in two pits its depth exceeds 10 fathoms. From its southern apex it discharges the Leven, which flows due east between the Lomonds and Benarty to reach Largo Bay after a course of 16 miles.

Three miles above its mouth the Leven receives the river Ore from the east. This stream rises at a height of nearly 1000 feet in the Cleish Hills and thence flows eastwards until it meets the Leven. It has several tributary streams, which, following the general trend of the land as left by the ice action, also flow east or north-east—the Fitty from Loch Fitty near Dunfermline, which meets the Ore near Lochgelly, and the Lochty from Benarty, which meets the Ore near Thornton. On the north side, the Leven receives one important tributary, the Conland, which rises in the Lomonds and flows past Markinch. Round the lower courses of these various rivers is formed a fan-shaped plain area. To the east it is bounded by the sweep of Largo Bay; to the north lie the Lomonds and the heights of the Neuk, between which the depression at Markinch allows fairly easy communication up the Conland to the Howe. Westwards the lowlands of the river Leven stretch in a narrow strip to the Kinross plain. To the south of this the land rises in long parallel ridges trending west or south-west, between which are the upper valleys of the Ore, Fitty, and Lochty. Along the coast to the south lies a smaller plain through which the little river Tiel flows eastwards to reach the sea at Kirkcaldy. This area is separated from the Leven riverlands by a gentle ridge running eastwards from the higher

land to the west: southwards it ends where the volcanic formations of the Burntisland district rise close to the coast at Kinghorn.

The geology of this part of Fife is most important. To the north of the fault from Largo to Leslie lies the carboniferous limestone already described, but, southwards of this, the fault has preserved the more recent rocks which give the area its present economic value. These lie for the most part in the triangle marked out by the coast, the fault, and a line drawn from Leslie to Pathhead on the coast. Westwards of this the carboniferous limestone reappears: eastwards lies a narrow strip of millstone grit exposed in a shore section from Pathhead to Dysart. Above this to the east are the true coal measures, which, except where, along the coast from West Wemyss to Methil, a line of still more recent rock (Upper Red Sandstone series) occurs, fill up the rest of the triangle and are connected under the firth with the measures of Midlothian. Isolated from the larger coal area, a small field occurs near Kinglassie, which runs tongue-like up the Lochty valley from the millstone grit, with carboniferous limestones on either side.

The Western Highlands.—Westwards of this plain long elevated ridges run north-east and south-west, swell into hills and then sink to the coast lands of the upper firth or the river lands of the Devon valley. Most of the rocks belong to the carboniferous system, with igneous rocks contemporaneously erupted, not intruded as in the Neuk. Round Burntisland calciferous sandstone is present, and the coast sections there show remarkable examples of alternate sedimentary and igneous bedding; but the rest of the area as far west as Culross is composed of underlying carboniferous limestone with lavas capping the higher hills. Of these latter the best marked ridge runs from Benarty south-westwards, temporarily disappearing between that hill and the Cleish Hills in the depression already noted as connecting the Kinross plain with the upper Ore valley. Westwards of this rise the Cleish Hills, and a little to the south of them, and parallel, the two volcanic vents of the Saline and Knock Hills, 1178 and 1189 feet respectively. To the south of these runs the narrow valley of the Fitty, then another parallel ridge culminating in the Hill of Beath (705 feet), near Dunfermline. East of this, and between these northern heights and the igneous hills around Burntisland, is a wider valley drained northwards by the Ore and the Tiel, southwards and south-eastwards by the Lyne, on which stands Dunfermline, and by the Keithing falling into the Forth at Inverkeithing. Thus these hills around Burntisland stand somewhat isolated, with a shallow but fairly wide valley between them and the elevations to the north. The highest of these remarkable hills are Cullalo and the Binn (632 ft.), while similar formations project out into the firth to form the peninsula on which Pettycur stands and the islands of Inchkeith and Inchcolm. West of Inverkeithing the further presence of these rocks is shown by the peninsula and promontory of Ferryhill, which, jutting out over against Mons Hill in Linlithgowshire, almost encloses the Upper Firth.

The Carse lands.—Westwards of this, low spurs from the interior come down to the coast, with here and there a break through which some small stream flows to the firth. At Longannet Point these ridges begin to draw

away from the shore, and running inland are divided by the Black Devon, which twists down from the Saline Hills through the town of Clackmannan. Further west a single low ridge runs parallel to the Forth, and between it and the Devon to the north. This latter stream emerges from Glendevon and, meeting the opposition of the Cleish Hills to progress due south, turns in an abrupt curve at "Crook o' Devon" away from Loch Leven and elects to flow westwards to the Forth through deep ravines and chasms until near Dollar it comes out on to the level. Between it and the Forth there now lies the low continuation of the western heights, which forces the river to flow along the base of the Ochils, parallel to, but in the opposite direction from, its upper course in the higher longitudinal valley. On its right bank it receives numerous burns which have ploughed deep picturesque glens down the steep and in some places precipitous face of the hills. But west of Menstrie these burns find their own way to the Forth, for, the ridge between the Devon and the Forth coming to an end at Tullibody, the Devon turns abruptly south and flows for two miles across the Carse of Clackmannan, a plain similar in physical characteristics to the Howe. The river thus reaches the Forth after a course of 33 miles, only 5 miles south of its source in Blairdennon Hill. The alluvial plain of the Carse now narrows westwards between the Ochils, lying here almost due east and west, and the river Forth, flowing south-eastwards until communication is almost stopped by the Abbey Craig, an igneous mass showing the crag-and-tail effect, which rises between the river and the hills some 2 miles west of Devonmouth. Just to the west of this the Allan Water reaches the Forth from the flanks of the Ochils.

The geology of this plain area of the Devon and the Forth is similar to that of Strathleven, and it is for the same reason important. A line of fault runs east and west along the base of the Ochils, cutting the lavas of the Old Red Sandstone; south of this lie the preserved carboniferous systems. The limestone which occupies the Saline Hills ends at Culross and is bounded to the west by a strip of millstone grit which in its turn bears, as in the Leven plain, the important true coal measures. These seem to be an extension northwards of the great Lanarkshire field, buried in East Stirlingshire and the Carse lands under the more recent deposits of the Forth.

Soil.—Despite the close connection which appears to exist between the volcanic areas and the higher lands there is nothing to indicate that volcanic activity directly determined the present configuration. This was more probably produced in its main outlines by epigene action during long geological ages, and it is really due to the greater resisting power of the igneous formations that they in many cases now stand out as the higher ground. Then the ice flood descended from the Highlands, mounted over the Ochils and turned eastwards into what is now the Firth of Forth; but it came upon an area the main features of which were substantially those of to-day, only higher, more rugged, and covered with the results of long erosion. The ice planed down the hills and swept away the surface accumulations to lower levels, where it mingled them with other deposits it had brought from the north and strewed

the mixture to form a soil over the land. When it retreated, the hills had decreased in height; many, like the Abbey Craig or the May Isle, had assumed the crag-and-tail formation, their basaltic-topped precipices fronting westwards whence came the ice. Volcanic chimneys of solidified ash had been ground down to the regular cone-shape of Largo Law or Kellie Law. Long regular ridges now ran in an east-west direction, while round the coast were traces of former beaches at heights of (roughly) 25, 50 and 100 feet. More important still were the vast accumulations which the ice left behind to form the superficial covering of the land. Of these the most widely distributed is till or boulder clay, which, pushed along from the north-west, filled up the lower valleys, mounted up the higher hills to over a thousand feet, and eventually passed under the waters of the firth to form an impervious bed above the coal measures there. It now forms over most of the area the surface soils, though in some places, which it has failed to cover, the soil is directly derived from the disintegration of the underlying rock; in some other places the boulder clay is covered by still more recent deposits. Where this clay forms the soil—mainly over the carboniferous system—it is cold, stiff and retentive, supporting in its natural state vegetation of a rushy character; but when properly treated by modern methods it has been found to be good corn land. Its texture and appearance depend largely on the rock from which it is derived: if in great part from the sandstones, it is warm in colour, sandy yet stiff in texture: if from the carboniferous systems, blue or black. It is among the higher ground of the peninsula that this covering of clay is sometimes broken by underlying rock. A conspicuous instance of this is to be found in the Ochils, the peaks of which rise above the limit of the clay and are covered with thin soil composed of their own detritus and capable of supporting rough pasture and heather. The lower slopes are covered with boulder clay. Then in the hills of the East Neuk are other examples of soils derived from underlying rocks. These are rarely sedimentary owing to the comparative ease with which such rocks weather away; yet at one spot, called suggestively Ceres Moor, the sandstone crops out to form a poor, thin soil. More numerous and of greater importance are the rich loamy soils derived from exposures of igneous rock. These soils are warm and fertile and usually contain a plentiful supply of phosphate of lime owing to the presence of apatite. In marked contrast to the dark rushy vegetation of the boulder clay, they support bright green grass, and thus it often happens in the East Neuk that the soils of the higher lands, which are composed of rotted igneous rock, are covered with more flourishing vegetation than the lower slopes of boulder clay. Otherwise the soils of the Neuk, except in some important stretches to be afterwards noted, are cold and clayey. To the south of the Neuk, the Ore valley and the highlands near Dunfermline are covered with a subsoil of boulder clay over which sometimes lies a thin loam.

Above the boulder clay were deposited more recent sands and gravels, which are now found in Stratheden, Strathleven, the plain of Kinross, the Devon valley, and their transverse depressions. They also

run rim-like round certain stretches of coast. These deposits seldom rise above 200 feet in the southern parishes of the Neuk, and in many places they run along the 100-foot beach. From below Largo Law they stretch inland as far as Colinsburgh, and then drop down to the 100-foot terrace along the coast of the East Neuk and round Fife Ness to Kingsbarns. Thence they rise up the valley of the Kenly Water to Kinaldy (400 ft.), then contract at Boarhills to the 100-foot beach until they reach the valley of the Eden. To the north of this they reappear near Leuchars and creep up Lucklaw Hill to Balmullo. Thence they run as a narrow strip along the whole length of the Motray Water, between the boulder clay on both sides, until they join the larger deposits of the Howe through the Pass of Lindores. Along the north coast they form only a very narrow rim of gravel, for here the hills press close to the shore and leave little room for deposition. The soils produced over these mixed sands and clays of the older marine deposits are generally good loams. In Kinross the soil is occasionally clayey, but more often light and sandy, as there is an extensive development of morainic gravel. Round the base of the Lomonds it is light but sharp and valuable for grass. The gentle inclines of the Howe, where the 100-foot beach is well developed, are very fertile and productive, but the centre of the Howe near Ladybank is shingly, and it would seem as if the coating of richer earth had been washed away by a current of water. Among the most fertile soils of the peninsula are those lying on the 100-foot beach already described as lining the coast from St. Andrews to Largo, where is found a deep rich loam. Along this coast are scattered here and there other deposits of marine clays, evidently laid down when the surrounding seas were ice-covered. These occur near Elie, where they form light and sandy soils, and again at St. Andrews. Thence they run up the Eden to above Cupar, forming sandy soils which pass eastwards into the dunes of Tents Muir and Pilmour Links, where a littoral vegetation flourishes. . On the coast strip from Leven to Inverkeithing the soil varies from light dry to rich clayey loam, the most fertile districts being the alluvium area of the Leven, the raised terraces near Kirkcaldy, and the patches of igneous soil in the Burntisland district. The coasts of the upper firth between Dunfermline and Culross are very fertile, since the soil is derived from an igneous outcrop and from the deposits of the raised beaches which appear near Torryburn. Westwards of this the soils of the carse lands of the Forth are alluvial, for the upper firth, not being open to the influences of the sea, is favourable to deposition. These soils are composed of the finest clays without stones but with occasional beds of marine shells. In most parts they have been stripped of their peaty covering—a significant indication of their original condition—and are very fertile under modern methods of lime manuring.

Climate.—The vegetation which flourishes on these soils is determined by the climate. But the peninsula is too small to be able to claim a distinctive climate of its own, and the actual figures of temperature and rainfall, which vary from place to place according to local conditions, are confined to certain limits by the general climatic conditions common to the

whole east of Scotland. When compared with the figures for the West Coast the temperatures show a faint approximation to a continental type—slightly colder winters and slightly warmer summers. For while the broad outlines of the climate are fixed by proximity to the Atlantic, these are a little modified by a position on the leeward side of Scotland and a consequent exposure to continental influences which the shallow North Sea does little to temper. Hence one would expect a gradual intensification of the continental features from west to east, the maximum being attained as far east as possible, away from the Atlantic and yet not coming under the influences of the North Sea. That the presence of this sea has very little influence at all, in fact only on the coastal rim, is seen from the data of the temperature stations of St. Andrews and Feddinch Mains, the latter only three miles south-west of the former, and 300 feet high, with an eastern exposure. It has the distinction of experiencing the lowest winter temperatures and the greatest range of the Fifeshire stations—that is, the climate of Feddinch Mains is the nearest recorded approach to the continental type, though naturally in a rather mild form.

TEMPERATURE RECORDS FOR FIFE.

Station.	Years.	Mean Annual.	Mean Jan.	Mean July.	Range.
St. Andrews . .	1855-95	47·1° F.	38·2° F.	58·0° F.	19·8° F.
Feddinch Mains	1855-95	46·0 F.	36·6 F.	57·7° F.	21·1° F.

There are also marked differences in the annual rainfalls of east and west. The rain-bearing winds from the Atlantic have access to the west of Fife through the mid-Scotland valley: but the highlands of the peninsula are in the west, and the east thus tends to have its drier continental tendencies aggravated. Consequently there is a marked diminution of rainfall from west to east:—

RAINFALL.

Station.	Height in feet.	Years.	Mean Annual Rainfall in inches.
Dollar	178	1866-90	43·39
Loch Leven Sluice . .	365	1866-90	36·10
St. Andrews	57	1866-90	29·41

The seasonal and local variations may be briefly summarised. The spring is, comparatively speaking, the dry season, owing to the prevalence of east winds from the continental anti-cyclonic area: temperatures are low and there are occasional late hoar frosts which sometimes damage the young crops. In summer the higher temperatures of the

east encourage sudden showers of the thunderstorm type, which add considerably to the total rainfall of that part ; both in the east and in the west, however, the wettest period is in the late autumn and the winter. The continental conditions in the east tend to raise the autumn temperatures slightly above those experienced in the west of the peninsula, while on the actual coastline proximity to the North Sea moderates the winter temperatures a little. Local conditions are affected by elevation and exposure ; the higher lands are colder and the hill slopes facing the west are wetter. High winds, too, are aggravated by local configuration, being stronger in the funnel-shaped parallel valleys and on the unprotected slopes of the east ; but, conversely, the Ochils protect the Devon valley from north winds and the Lomonds shelter the Markinch district to their south-east.

The climate is on the whole particularly favourable to agriculture. The peninsula enjoys all the advantages of the climate of the north-west European margin, and by its leeward situation in the east of Scotland it escapes the great disadvantage of excessive wet which has retarded and still retards the agricultural development of the otherwise fertile lands of the west. In the peninsula the climatic disadvantages are minor—rare late frosts or occasional thunderstorms. Neither the rainfall of the wetter west nor the dryness of the warmer east is excessive. And, moreover, full advantage of this favourable climate can be taken, for, particularly in the straths of the east and on the coastal rim—the most favoured climatic areas—exceptionally fertile soils occur. But all over there is little unproductive land, for the whole history of the area shows the gradual transformation of original undrained waste into profitable farming land. At the present day the percentage of cultivated land is very high—for Fife alone nearly 80, for Kinross above 60. The great agricultural areas are the eastern plains of Stratheden, Kinross, and the coastal rim, which the warmer and drier summers and autumns make particularly suitable for wheat. The interior of the East Neuk is also extensively and successfully cultivated, though the exposure and elevation may retard the harvests perhaps three weeks later than those of the favoured coastal strip. Modern scientific farming has changed the soils of the wetter west into good land. The pastures of the higher hills are of considerable economic importance, and even the dunes of the east coast, covered with coarse grass of little or no agricultural value, have been turned to account, and form as golf links a popular and paying asset to the numerous coast resorts.

II.—Economic Development to 1707.

After these considerations of the relief, geology, soil, and climate, it remains to show how they have affected the history and development of the peninsula, and to sketch its present condition.

Local Isolation.—One is prepared for local isolation from the nature of the relief. There were felt none of the centralising influences of a great river such as made Lanarkshire the basin of the Clyde, or Perthshire the basin of the Tay ; nor were there converging lowlands such as meet

on Ayr, and make it a county town. It is true there were lowlands capable of development and of supporting a population, and the cause of centralisation was helped by the fact that the lowlands were to some extent continuous, inasmuch as they diverged from a common centre, Kinross. But Kinross was far away in the interior and not near the sea, and between the lowlands lay belts of uplands, not without their own economic value in early times, but nevertheless obstacles to communication.

In addition, while physical relief alone would have prevented the early growth of an efficiently centralised county, its bounds coincident with the natural barrier of the Ochils, the tendency to disunion was emphasised by the once extensive presence of forest, marsh and lake. The forests have been cut down, most of the marshes have been drained, and many of the lakes have been reduced in size or drained away altogether—either by the work of man or by the emerging stream cutting its way down through the rocky barrier which formed the lake. But as late as 1662, when Timothy Pont published his map of Fifeshire in Blaeu's Atlas, the land was dotted with lochs and marshes which no longer exist. To the south-west of Tayport, Timothy shows a lake which the monks of Balmerino called the Swan Loch: it is now completely gone. The whole level of the Howe was probably once occupied by a lake which decreased in size as the Eden cut its way through the bar of higher land from Cupar to the sea. In historic times this had shrunk to what was nevertheless the largest lake in the area after Loch Leven, the now vanished Loch Rossie near Auchtermuchty. It must have been surrounded by an extensive marsh, for the monks called the site of the modern Ladybank, in the centre of the Howe, Our Lady's Bog, when they came there to cut peats for the Abbey of Lindores. Loch Leven itself was once larger by a quarter, and each of the various tributaries of the lower Leven flowed—some indeed still flow—through a lake or marsh. Near Mark*inch* the Conland drains a level strip of ground known by the suggestive name of the Myres. The site of the old Loch Ore is preserved in the name of a village and mansion at the foot of Benarty, and Blaeu's Atlas shows near Kinglassie quite an extensive lake on the course of the Lochty. The Fitty still flows through a small loch on the west of the Hill of Beath, while to the east the waters of the Tiel come from Moss Morran, a part of which still exists, though once it must have stretched right across the valley to the Burntisland Hills. The carse lands of the west were probably marshy, for the English cavalry found it impracticable to advance up the carse of Stirling on their way to Bannockburn; and the carse of Stirling is similar in formation and character to the smaller carse of Clackmannan on the north bank of the Forth.

Where the soil and climate would permit, some areas were covered with forests, oak on the richer soils, pines on the sandy and more exposed parts. How extensive these forests were it is difficult to estimate; but the presence of remains of the aurochs has been adduced to prove that they were once fairly extensive. At any rate, three are known to have existed and to have been of geographical importance

in early times. On the hill slopes which stretch round the carse of Clackmannan stood Clackmannan "Forest," a district of heath, moss and thicket, which emphasised the isolation of the carse lands from the rest of the peninsula. Remains still exist in the district known as "the Forest," near Clackmannan town, and in Tulliallan Forest to the north of Kincardine. Then to the north of the Ochils was the Forest of Earnside, which covered the lower hill slopes of the Ochils, and ran from the Earn river lands to the Pass of Lindores, thus rendering more difficult an important—in mediæval times almost the only convenient—pass leading to Strathmore. The third forest lay on the slopes of the Lomonds, and the excellent hunting which it afforded attracted the Stuarts to Falkland. But it is fairly certain that the "forests" were by no means confined to these three areas, and that many districts were covered with marsh, heath and spinney similar to those mentioned.

The location of these extensive marshes and forests may help to explain the site of some of the antiquities of Fife. Crannogs have been found near Strathvithie, where there was an old lake, and at Collessie near the marshes of the Howe; and the choice of the situation of the ancient camp—Roman or otherwise—near Ballingry is understood when it is remembered that it was surrounded by the loch and marsh of the Ore. But of far greater geographical interest is the effect which forest, loch, and marsh had in dividing up the peninsula, and in diverting routes.

Peninsular Isolation.—Then to local isolation was added peninsular isolation. The peninsula forms a natural area. On three sides it is surrounded by sea or firth, on the landward side by hills of considerable height. And so if local conditions favoured local independence, isolation from the rest of Scotland might have tended to unity in the peninsula itself. To a certain extent this was achieved. All through its history peninsular unity has so far triumphed over local independence, that though there might be a multitude of separate shires and districts in the interior, an area *almost* coincident with the peninsula was usually regarded as a political entity of the rank of such old natural divisions of Scotland as Tweeddale, Lothian and Moray; its isolation was recognised, and it was named Fife long before the creation of such a division as a shire.

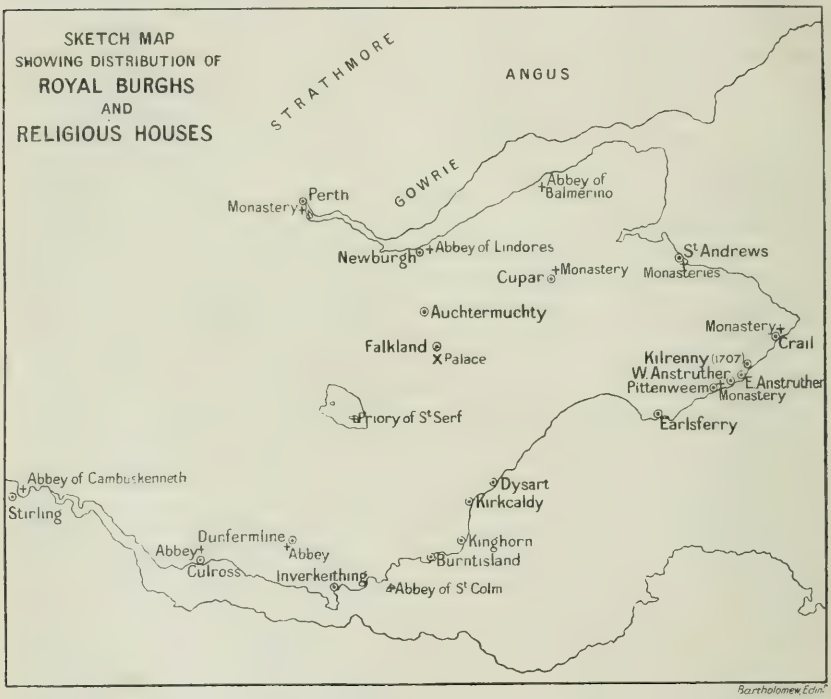
Yet it has been hinted at that the term Fife did not quite cover the whole peninsula. The exception is not Kinross, which is a comparatively artificial erection with the geographical justification (slight at that) of a ring of highland; it is Clackmannan. In early times that area had but little connection with Fife. Northwards the Ochils proved an almost impenetrable barrier, twelve miles broad and in some places precipitously steep above the river lands; eastwards lay the Saline Hills, and in addition the "Forest" of Clackmannan, which rendered difficult routes up the Devon valley and along the coast. There was really far more open communication with Stirling than with Fife, and this is seen in its history and in its very name, Clackmannan, "the Rock of Mannan." Mannan was an ill-defined district stretching from the moors above Falkirk, where the name appears in Slamannan, along the carse of Stirling, and up the valleys of the various rivers which converge on the

town of that name. The area which eventually became Clackmannanshire was evidently included in this district, which formed a battle ground for the Pict, Scot, Angle, and Strathclyde Briton. When these races consolidated to form a Scottish nation, part of Manman, the carse of Stirling, lay along the great north-south route from Lothian to Strathmore and Moray, and this part consolidated around Stirling. But the smaller carse lands to the north of Forth lay off this line of communication; they were separated from Stirling by the Abbey Craig between the Ochils and the river, and, lying as it were in a back water, they preserved their existence as a separate county independent of either Fife or Stirling, though they had much more intimate relations with the latter than with the former.

To return to Fife, the history of that peninsula early gives evidence of the influence of its geographical situation. It was nominally comprised in the so-called kingdom of Pictavia, but owing to its position it acquired an independence which was evidently unusual even for that nebulous state. It either preserved or assumed the title of kingdom, and when eventually such a state could no longer be allowed to exist, its mormaers had to be bribed with prominent court duties and positions. The attempts of a higher civilisation to enter the peninsula show what obstacles had to be overcome ere its isolation could be broken down. A new culture could not very well come from the land, for the Ochils, the river marshes, and the forests cut off communication with Strathmore or Monteith; it could much more easily cross the firths or come directly overseas. It probably came first of all from the latter, for there seems to have been a considerable immigration of Frisians contemporary with, and most probably a part of the so-called Anglo Saxon settlement. The next successful invaders also came overseas—the Danes: and certainly the coast of Fife with its numerous small creeks and its rivers leading inland was just such as would tempt sea-rovers. Before the aggressive period of the Danish invasions, Northumbria had risen to greatness, and forcible incorporation with this kingdom was prevented only by the difficulty of crossing the firth. But the Anglian influences, which had ebbed after the defeat of Nectans Mere, returned when the Scottish kings acquired Lothian. Thence Anglian civilisation spread across the firths, and by a strange coincidence the event which rendered its triumph permanent was a landing from the sea, when Saxon Margaret disembarked at Rosyth on her way to King Malcolm's palace of Dunfermline.

The Religious Foundations.—With Margaret's elevation to power in Scotland the supremacy of the Roman over the Celtic Church was ensured, and by the time of David I. the newer church was erecting its first great abbeys and monasteries. These were more than religious institutions; they were civilising agencies which spread a superior knowledge of agriculture and stimulated commerce. As several very important foundations were built in the peninsula, their precise situation deserves some note (see sketch-map). Most are to be found on the coast: for here were good soils, an encouraging climate, advantages for fishing, and numerous harbours. But not all of the

coast was equally favoured. The Ochils come close to the southern shore of the Firth of Tay, and if this was an advantage, in so far as the hills gave good pasture and the fall of land ensured a certain amount of natural drainage, the cultivable area was restricted to a very narrow rim along the coast. Moreover, though the navigable channel was near the southern shore of the Tay, there was a decided lack of harbours. And so along Tayside only two abbeys were founded. One was at the northern entrance to the fertile gap of Lindores, and bore that name. It lay between the fisheries of the Tay and the fresh-water loch of Lindores,



and below it grew up the port of Newburgh, described, in contrast to the decaying town of Abernethy, a few miles away in Perthshire, as the "novus burgus juxta monasterium de Lindores." Further east, where the hills decrease considerably in height, and a little curve on the coast could be used as a harbour, stood the Abbey of Balmerino (1227), in a fairly good situation for ferry traffic with Angus.

The east coast had even fewer attractions, for the coast of Tents Muir was without the slightest vestige of a harbour, the soil was unfit for cultivation, and further south, across the shallow and muddy estuary of the Eden, low shelving rocks ran seaward, causing dangerous eddies and difficult approaches. Yet here on the slopes, above the inconvenient harbour formed by the mouth of the little Kinness Burn, was fixed the ecclesiastical capital of Scotland, St. Andrews, with its cathedral and its three monasteries. It is difficult to find any geographical

explanation of this importance. The situation was indeed protected from marauders, and this consideration does seem to have influenced the site of the primacy in its transit across Scotland from Iona to Dunkeld and Abernethy. But such a recommendation would apply to any situation east of the Ochils. Seemingly the determining attraction was the presence there of the only relics of an apostle which Scotland possessed, and the geographical factors of a good soil (except on the coast to the north) and a small harbour acted only in making the growth of a religious centre not impossible. Along the Firth of Forth, however, there was no lack of good soil or good harbours. In the east priories were founded at Crail and Pittenweem: then past the low sandy shores of Largo Bay the monks of the Abbey of St. Colm, situate on a small islet in the firth, farmed the fertile lands of Aberdour and Donibristle. On the productive strip near Torryburn the piety of St. Margaret founded an Abbey of Dunfermline at its eastern extremity, while the Cistercians raised another at Culross in the west. Then under the protection of the king's castle of Stirling was the Abbey of St. Mary of Cambuskenneth, where monks from Picardy, probably with a previous experience of marshy soil, drained the links of Forth. It was some time before the new agriculture penetrated inland, but though the clays of Strathore were not inviting, the more fertile soils of Kinross and Stratheden attracted attention. One monastery was founded at Cupar, and another displaced a Culdaic settlement on an island of Loch Leven, whence its monks tilled the lower slopes of the Lomonds and pastured their sheep on the upper.

Mediæval Commerce and the Royal Burghs.—The effect of these religious settlements was more than an improved agriculture: they stimulated commerce. Besides cultivating the land, the monks improved communication by building bridges; they developed the fisheries; they became the bankers of the time, and their demands for incense and articles of price brought foreign merchants to Scottish shores.

The situation of the peninsula was certainly advantageous for trade. Even if Scotland lay on the bounds of the known world it had considerable economic importance, for its wools and skins were as necessary to the manufacturing centres of Brabant and Flanders as the raw products of a non-manufacturing country are to the Britain of to-day. Moreover, in addition to the better climate, the east of Scotland had the advantage over the west of facing the continental trading towns, and so the fertile areas of Moray, Fife, Lothian and Tweeddale early carried on a considerable foreign commerce. But after the Wars of Independence, when the Scottish monarchy became a feeble distracted thing, Moray lay open to Highland raids, and Tweeddale to English invasions. From the Highlanders Fife was protected by the Ochils: from the English Lothian was protected by the Lammermuirs. Fife, however, might seem to have the advantage over Lothian as it had taken little part in the devastating Wars of Independence. These had raged up and down the routes from England to Moray, in Lothian, Stirling, and Strathmore; and Fife lay sheltered behind the Ochils. This advantage might seem to be increased by the superiority of the Fife ports on the Firth of Forth. They were sheltered from the north-east and, as the five-fathom line ran quite close to the

shore, comparatively deep. To the north the ports of Angus shared the disadvantages of the exposed east coast of Fife—broad sands or dangerous rocks; and to the south the traffic of Lothian had to concentrate at Queensferry or Leith. But despite these advantages over the rest of Scotland, Fife was the centre of the kingdom only during the short period when the monarchy in its progress from Strathmore to Lothian halted mid-way at Dunfermline, as if, though it had broken with its Celtic subjects, it did not quite trust its new English ones, and thought the isolation of Fife rather an advantage. Lothian did eventually become the centre of the kingdom. It lay at the end of the mid-Scotland valley, and such of the products of the West Coast as did not find their way to Bordeaux, the only commercial centre with which Ayrshire could trade directly, turned eastwards to Lothian. From this traffic Fifeshire was separated by the upper firth. Indeed, if the Ochils and the firths protected Fife from the Highlanders and other invaders, they practically cut it off from participation in the trade of the interior. Communication had to be preserved with Strathmore by the Pass of Lindores, which led from the north, not to a port but into the Howe, and with Monteith by the carse of Clackmannan, which had really no well-developed connection with Fife at all. And so the produce of Strathmore was shipped directly from Perth or Dundee, while that of Monteith was shipped from the river ports of Stirling or Clackmannan. Yet Fife was second only to Lothian. Its position secured it from war or other disturbance—for example, it lay completely away from the Douglas wars—and its inhabitants could develop the natural riches under favourable conditions as far as they then could. In addition to its fertile coastal strips, with their rich abbeys, the extensive uplands of the interior and the Ochil Hills furnished abundant supplies of that most valuable of mediæval products, wool, and this was almost sufficient in itself to form a good commerce. Even if the peninsula was practically self-sufficing, its isolation enabled it to advance relatively faster than other parts of Scotland, and to support a safe and profitable trade. Hence one is prepared to find several important towns in mediæval Fife; but later, by the time of the early Stuarts, the number of royal burghs is surprising. There were no less than seventeen royal burghs in the peninsula alone out of about seventy in all Scotland, and their location leads to some interesting conclusions (see sketch-map, p. 82).

All except four were on the coast; and of these four inland burghs three (Cupar, Falkland, Auchtermuchty) were in Stratheden, and the fourth (Dunfermline) was only three miles from the coast. From Perth to Fife Ness, that is, on the coasts of the Firth of Tay and St. Andrews Bay, there were only two (Newburgh, St. Andrews); but in the short strip of coast from Fife Ness to Kincraig there were no less than five (Crail, Anstruther-Easter, Anstruther-Wester, Pittenweem, Earlsferry), and one (Kilrenny, 1707) was subsequently added—all these on a coast of thirteen miles. None were to be found on the low shores of Largo Bay from Kincraig to Dysart, but between Dysart and Ferryhill, fourteen miles in a direct line, there were five (Dysart, Kirkcaldy, Kinghorn, Burntisland, Inverkeithing). Westwards of this lay Dunfermline, and

then Culross. There were no royal burghs in Clackmannanshire or Kinross, Strathore or Strathleven. Stratheden was the only district which contained royal burghs more than three miles from the coast. Of these seventeen royal burghs, six were in close proximity to religious foundations.

Here no doubt local isolation came into play. Trade could not be centralised at two or three great ports as in Angus or Lothian, for with the smaller vessels of those days any one of the numerous fairly deep creeks was convenient, and since the interior was cut up into independent valleys, each valley could have its own little port. But the distribution of these royal burghs may surely be taken as giving some idea of the balance of population. The conclusion then is, that Stratheden held the bulk of the population of the interior, that the coasts were as a whole much more developed than the interior, particularly the coasts from Fife Ness to Kincraig and from Dysart to Ferryhill. Are there any further geographical explanations of this?

Excepting Stratheden one presumes, from the absence of royal burghs in the interior, that it was not capable of supporting a centralised population, that it was still an undeveloped, raw material producing area. Probably there was little cultivation, for the river lands, before scientific drainage, would be swampy, and even on the slopes the clayey soils would not be very productive under mediæval methods. There are, indeed, places mentioned in the interior by various travellers, but they seem to have been very small, and noteworthy rather from their position. Thus Markinch, which was, be it noted, situated in the most favoured agricultural district of Strathleven, and was what might be called a pass town, is mentioned in the Chronicle of Edward I., but it had only a church and "iij houses." Kinross was called into existence by its position, where routes diverged down the various lowlands from Loch Leven; but though it occasionally figured as a royal residence it was never created a royal burgh. Nor were there any in Clackmannanshire, though a village, which eventually became the county town, lay round a tower built by the Bruce on a low spur running riverwards through the carse lands. Why then this development of Stratheden? It had a favourable climate, and, most important of all, the soils of its hill slopes above the marsh of the Howe were warm and fairly dry when most other soils tended to be cold and rather wet. Here then agriculture had evidently been spreading, for the three royal burghs of the Strath are all near the slopes, and one of them, Auchtermuchty, bears the significant seal of a sower, a horn of plenty, and the motto "Dum sero, spero." But in the cases of Falkland and Cupar there were additional reasons for importance. It seems probable that the Howe and Loch Rossie were difficult to cross. Falkland lay between them and the Lomonds, rising rapidly to over a thousand feet. Hence routes round the Lomonds, and from Perth to the ferry ports on the Firth of Forth, were constricted at Falkland, but it derived a more conspicuous importance from its royal residence near the Forest of Falkland and its hunting. Then the route from Perth to St. Andrews, two centres of supreme importance in mediæval Scotland, curved through the Pass of Lindores and round the foot of the marsh to

Cupar, where there was a convenient crossing of the Eden. Further, the route from the Forth ferry ports to Angus would naturally cross the Pass of Markinch, and keep the southern hill slopes above the Howe until a favourable opportunity of crossing the Eden presented itself. This was again at the foot of the marsh, and Cupar, at the junction of the two great routes across Fife, and conveniently situated equidistant from the Tay, St. Andrews Bay, and Largo Bay, naturally became the county town.

In discussing the distribution of the ecclesiastical foundations, the disadvantages of the coasts of the Firth of Tay and St. Andrews Bay have been noted—a narrow cultivable strip backed by hills which prevented expansion inland, sands or shelving rock, and a lack of harbours, or, at the best, inconvenient ones. It is easy then to see why traffic on this coast, except that of the ferry routes to Angus, should have centralised into the two burghs of Newburgh and St. Andrews, both beside religious foundations. Newburgh was the port of Lindores, but it was more; it was a pass town and an outlet for the produce of the slopes of the Howe, which were now becoming more important. And even though its little harbour was inconvenient, St. Andrews was the only possible outlet for lower Stratheden, and it, of course, derived additional importance as a religious centre. But up till this time (Charles I.) the two coastal strips of the Firth of Forth, from Fife Ness to Kincraig and from Dysart to Ferryhill, had always been the most important parts of the peninsula. Here were the great religious houses and the royal burghs, for they enjoyed the following advantages. The numerous creeks afforded excellent harbours sheltered from the north-east; behind them the soils of the igneous outcrops or of the older marine terraces were exceptionally fertile, and had been developed by the monks. Further inland were hills, those of the East Neuk or around Saline and Burntisland providing suitable pasture for sheep conveniently near the coast. In addition were the pursuits of fishing, relatively more important when all Europe was Catholic, and of salt-making, particularly in the western series of burghs, where for the first time the proximity to "sea-coal" became of economic importance in connection with this manufacture. Hence these favourably situated ports had trading relations with Flanders, Zeeland (Campvere), and France, and there still survive in many of the smaller burghs, particularly in Crail and Dysart, buildings of which the quaint Flemish or Dutch architecture recalls this profitable intercourse. Westwards of Inverkeithing lay the royal burgh of Culross, but, with the exception of fishing, the same industries as those in the eastern towns made Torry, Kincardine, and Alloa busy little river-side ports which had not as yet attained to the status of royal burgh.

Then followed a series of historical events which shattered the prosperity of the Fifeshire towns. With the Reformation and the fall of the old religion, St. Andrews and Dunfermline dwindled down to mere agricultural villages. The removal of the court to London left Falkland desolate. The fishermen of Anstruther and Kirkcaldy were slaughtered by the hundred on the Covenanting side at Kilsyth. The Dutch wars closed the European ports, and the Navigation Act the

English and Colonial. The saltworks and the coal mines ceased to supply any but local needs, and agriculture declined. With the Revolution, when secular interests predominated, the ruin of the Darien Scheme closed the prospect of a revival, and the Union extinguished the last vigorous industry, for the heavy duties on salt ruined the fishing. At the beginning of the eighteenth century the peninsula was in a state of industrial collapse.

(To be continued.)

THE DUKE OF THE ABRUZZI IN THE KARAKORAM.[1]

In the *Scottish Geographical Magazine*, vol. xxvi. p. 204, we gave a brief account of the progress and results of the Duke of the Abruzzi's expedition of 1909 in the Karakoram range and Western Himalayas, and this renders it unnecessary to recapitulate to our readers what they will find in great detail in the sumptuous and beautifully illustrated volumes now before us. The objective of the expedition was the Titanic peak now well known as K^2, reputed to be the second highest mountain in the world, with an ascertained altitude of 28,250 feet above sea-level. We say "reputed," because according to present measurements Kinchinjunga is lower only by less than a hundred feet, and revised and more accurate measurements may easily change the figures and establish the greater altitude of Kinchinjunga. Up to a certain stage in his approach to K^2 the Duke was going over fairly well-known routes, which had been used by Godwin Austen, Younghusband, Conway, Eckenstein, Pfanul, Guillarmod and others. Guillarmod's account of his expedition in 1902, *Six Mois dans l'Himalaya, le Kara-Koroun, et l'Hindu-Kush : voyages et explorations aux plus hautes montagnes du monde* justly attracted much attention and was noticed at some length in this *Magazine*, vol. xx. p. 584. But since his day the science of mountain-climbing has made great advances. H.R.H. the Duke of the Abruzzi has a well-established reputation as an experienced and courageous mountaineer, and he brought to the service of this expedition every appliance that experience, wealth, and ingenuity could suggest. In his determined effort to ascend the K^2 giant he made approaches from the south, the west and the east, and he secured photographs of the north, a side which was at once seen to be unclimbable; but all in vain. "The mountain is a quadrangular pyramid, the corners being formed by four main crests meeting at right angles—the south-west and north-east, the north-west and south-east. The first two are prolonged in long and powerful buttresses, proportionate in size to the mass which they sustain. The other two are cut off short and precipitously . . . all its sides are equally fortified with the most formidable defences against

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[1] *Karakoram and Western Himalaya, 1909: An Account of the Expedition of H.R.H. Prince Luigi Amedeo of Savoy, Duke of the Abruzzi.* By Filippo de Filippi, F.R.G.S. With a preface by H.R.H. the Duke of the Abruzzi. London: Constable and Company, Ltd., 1912. Two vols. Price £3, 3s. net.

the mountain-climber." Having most reluctantly abandoned the attempt on K^2, the Duke turned his attention to Bride Peak, some twenty miles to the south. Its altitude is 25,119 feet above sea-level, but when he had reached the altitude of 24,583 feet he had to retrace his steps owing to bad weather. In her "Notes on My 1912 Expedition to the Siachen or Rose Glacier, Eastern Karakoram," published in the January issue of this *Magazine* (p. 13), Mrs. Bullock Workman says, "Sometime I shall have something to say as to whether the Siachen is a complement of the Baltoro and what are the chances of a passage from one to the other, likewise upon the mythical Kondus and Chogolisa saddles." But the Duke does not seem to have found the Kondus and Chogolisa saddles mythical, for he encamped on the latter for several days at an altitude of 20,784 feet, and he had excellent views of the former, which is a little lower than Chogolisa, and at the foot of the Golden Throne peak.

Turning to the scientific results of the expedition, one of the most remarkable is in connection with the effect of the rarity of the air on the mountain-climber. Contrary to what might have been expected, "Twelve Europeans and fifteen coolies lived for about two months at above 17,000 feet of altitude, working regularly and not showing a single case of illness, even of the most fleeting character, attributable to mountain sickness. At the end of our campaign, seven Europeans spent nine days at a height of more than 20,700 feet, during which time four of them encamped for the night at 21,673 and 22,483 feet, and this without the inconvenience of sleeplessness. They likewise made two steep ascents, through deep soft snow, to 23,458 and 24,600 feet, without exhaustion, without lowering of morale, without exaggerated difficulty of breathing, palpitation or irregularity of the pulse, and with no symptoms of headache, nausea or the like. . . . The reason doubtless lies in the development and perfecting of the equipment, and in the gradual increase of knowledge as to the best plan of life and work under conditions of high altitude." Another very remarkable phenomenon of life in high altitudes was the loss of appetite. "It was possible for the lack of appetite to increase and become almost absolute repugnance to food, if after its appearance one moved and established oneself at a greater height. Thus, at Chogolisa Camp, the Duke and the guides had given up meat and lived on soups, coffee, tea, chocolate and biscuits. In the two ascents above 23,000 feet, their only food all day was a little chocolate, although they suffered no nausea or other unpleasant sensations. Of course, in the long run, this insufficient nourishment would cause a lowering of vitality, loss of flesh, and a certain amount of anæmia. However, the process is so slow that we were still, at the end of two months, in condition to make long marches without experiencing excessive fatigue." Throughout the expedition, the Duke and the members of his party eschewed the use of alcohol. The author has a good word to say for the Baltis, who with kind and considerate treatment turned out most courageous and effective transport-bearers.

In some respects the appendices are the most valuable part of this work. They furnish ample and most interesting details regarding the photogrammetic survey and the meteorology and altimetric calculations

recorded during the period of the expedition, and also regarding the geology and botany of the regions through which it passed.

To appreciate and enjoy this work properly, the reader must have before him the maps and panoramas by Cavaliere Vittorio Sella, of which it is no exaggeration to say that they are the finest and best which have yet appeared. Since the publication of Guillarmod's exceptionally well-illustrated work, the sciences of cartography and photography have made great advances, and the artistic and scientific photographers who accompanied this expedition have availed themselves of them to the full. They did not do their work without considerable trouble and personal risk from time to time, but the results are admirable. The beauty of the illustrations alone will induce many an admirer of scenery to embellish his library with a copy of this work. It remains to be said that Signore de Filippi is an excellent narrator, clear, precise and enthusiastic, with a due sense of proportion and sound judgment.

Addendum: A Geographical Description of East Lothian.—In connection with this paper (cf. p. 23)—proof of which could not be submitted to the author owing to his absence abroad—it should have been stated that the work of preparation was done at the School of Geography of the University of Oxford.—Ed. *S.G.M.*

OBITUARY

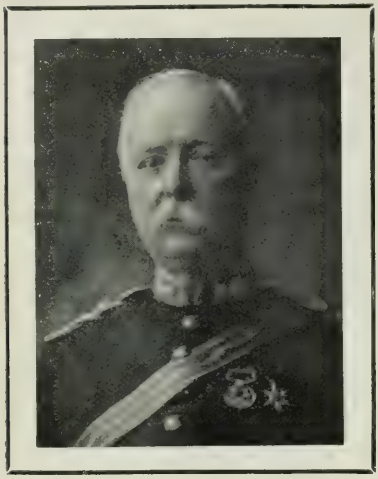
Colonel F. Bailey, R.E., LL.D.

By the death of Colonel Bailey, which took place on Saturday, December 21st, 1912, the Society and the Council lost one of their most energetic members, and a former Secretary.

Colonel Bailey spent his early manhood in India, where several years were devoted to military duty, including active service in Bhutan (1864-5), for which he obtained a medal. Subsequently, in 1871, he was attached to the India Forest Service, and was soon afterwards intrusted with the formation and superintendence of the Survey Branch of that Department. He continued to hold this charge until 1884, when a very large area of forest-land, partly in the hills and partly in the plains, had been surveyed and mapped. In 1878 he was appointed a Conservator of Forests, and organised the Central Forest School, of which he was the first Director. He held this appointment until 1884, in addition to that of Superintendent of Forest Surveys. When on furlough in England, in 1884, he was appointed by the Secretary of State for India to the charge of the English students at the French Forest School at Nancy. He visited forests in various parts of France, as well as in Switzerland, Germany, and Hungary, and published notes on them in the *Transactions* of the Royal Scottish Arboricultural Society (Gold Medal) and of the Botanical Society of Edinburgh. In acknowledgment of his services to

the cause of forestry, he was, in 1887, awarded the Cross for *Mérite Agricole* by the French Government.

On his return to India, in 1887, he was appointed temporarily to the Conservatorship of the Punjab forests, and was shortly afterwards selected by the Government of India to act as Inspector-General of Forests. In 1889 he was selected a second time to fill the office of Inspector-General, but was prevented from taking up the appointment by a temporary illness, which obliged him to return to this country.



THE LATE COL. F. BAILEY.

After his return he became Lecturer on Forestry in the University of Edinburgh, and, in 1892, was appointed Secretary of the Royal Scottish Geographical Society in succession to Mr. Silva White. This position he occupied for twelve years, until his resignation in 1903, which was due to failing health. The Society's appreciation of his devoted services during these years is expressed in the Reports of Council and of the Annual Business Meeting for that year (see the *Magazine*, vol. xix. pp. 668 and 669).

In spite of his failing health, Colonel Bailey was able to carry on his work as a Lecturer in Forestry in the University of Edinburgh until 1907, while other branches of his manifold activities, such as his editing of the *Transactions* of the Royal Scottish Aboricultural Society, he continued until the last.

As this brief account will indicate, Colonel Bailey's life-work lay mostly outside the activities of the Royal Scottish Geographical Society, but he gave to his work there that punctilious devotion which was his most marked characteristic. He possessed to the fullest extent the military virtues of promptness, exactness, and conscientiousness, and, to those who worked with him in his later years, it was pathetic to note his extreme unwillingness to delegate even minor duties, although his health was obviously making it difficult for him to discharge them. His interest in the Society's work did not cease with his resignation of the secretaryship. Not only did he take an active part in the work of the council during the years following his resignation, but during the temporary absence of the secretary, Mr. George G. Chisholm, in America during the past autumn, Colonel Bailey kindly undertook the duties of the office.

Colonel Bailey's work in connection with the Forestry Department of the University of Edinburgh received recognition during the past summer, when the degree of LL.D. was bestowed upon him at the July graduation ceremony. In addition to his association with the Royal

Scottish Geographical Society and the Royal Scottish Arboricultural Society, he was a Fellow of the Royal Geographical Society of London, and of the Royal Society of Edinburgh, and a past president of the Botanical Society of Edinburgh. Of his two sons, one, Captain Bailey, has already made important contributions to geographical science by his travels in SE. Tibet and the Mishmi Hills, of which some account appeared in the *Scottish Geographical Magazine*, vol. xxviii. p. 189.

We regret also to record the death of Léon Philippe Teisserenc de Bort, the distinguished French meteorologist, which took place in the early part of January. His name is associated with the investigation of the upper air by means of kites and *ballons sondes*. As a result of these investigations it was proved that the atmosphere is divided into two shells, the dividing surface lying at a height of about 10 kilometres, just above the highest clouds. The upper layer or *stratosphere* shows practically no change of temperature in a vertical column, while the lower layer or *troposphere* is the region of vertical temperature gradient and convection. Many of Teisserenc de Bort's investigations were carried on in conjunction with the American meteorologist Rotch, the founder of the Blue Hill Observatory, who died last year.

GEOGRAPHICAL NOTES.

Europe.

Drainage Conditions in the Jura.—A curious phenomenon, apparently of economic as well as of geographical importance, has taken place in connection with the piercing of the new tunnel through the Mont d'Or in the Swiss Jura. The engineers have encountered considerable difficulties, owing to outbreaks of water, and, according to the Paris correspondent of the *Times*, during the month of December water flowed from the tunnel for a few hours at a rate of 1100 gallons per second, reduced later to 900 gallons per second. At the same time the source of the Bief Rouge, a tributary of the Doubs, which runs through French territory, dried up, suggesting that the tunnel works had tapped the underground water which ultimately forms this stream. It appears probable, according to Professor Fournier of Besançon, that a permanent change in the watershed will take place owing to the construction of the tunnel, leading to an increase of water at Vallorbe on the Swiss side, and an impoverishment of the supplies of the French villages in the vicinity of Pontarlier. This means not only difficulties in regard to water supply on the French side, but also a great loss of power.

Africa.

Sleeping Sickness in Rhodesia.—Dr. Warrington York, director of the Runcorn Research Laboratories of the Liverpool School of

Tropical Medicine, delivered a lecture in Liverpool recently, in the course of which he gave an account of the conclusions arrived at by the Commission which has been studying the distribution of sleeping sickness in North-West Rhodesia. The most alarming result of the Commission's work has been to show that in this region it is not the fly *Glossina palpalis* which carries the disease, as in Uganda, but the species known as *G. morsitans*, which also acts as the carrier of fly-disease in domestic animals. The alarming feature of this discovery is that while the former fly has a restricted range in the areas where it occurs, never being found far from water, the common tsetse is very abundant, has a very wide distribution, and shows no tendency to follow watercourses. Thus the remedy for sleeping sickness which has been employed in Uganda, that of the removal of the inhabitants from the comparatively narrow area infected by *G. palpalis*, is inapplicable to Rhodesia. As yet no means is known whereby an area may be cleared of *G. morsitans*. The only possibility that remains is, therefore, the question whether the reservoir of the parasite can be got rid of. This reservoir is certainly constituted by the large game. We are glad to note, however, that Dr. York does not advocate the drastic remedy, which has been proposed elsewhere, of slaughtering the animals. He suggests, however, that an attempt might be made to drive them back from an experimental area, the area selected being one with a considerable human population, with the object of observing the effect upon the disease. In the newspaper account of the lecture from which the above is taken no mention is made of the question as to the migratory powers of the tsetses, that is of the extent of ground which it would be necessary to clear, or of the methods to be adopted to keep the big game from the area under observation.

Polar.

The German Antarctic Expedition.—The *Deutschland*, the ship of the German Antarctic expedition, which left Buenos Ayres in October 1911 (cf. this *Magazine*, vol. xxvii. p. 661), returned there in the beginning of January in the present year. The leader, Lieutenant Filchner, has sent a short telegraphic message to Europe, stating that, after passing through 1200 nautical miles of pack-ice, he discovered new land in lat. 76° 35′ S. lat. and long. 30° W., which he has named Prinz Regent Luitpoldland, after the late regent of Bavaria. The position suggests that the new land is a continuation of Coats Land (cf. the map showing Dr. Bruce's results in vol. xxi.), but the telegram goes on to say that the land is bounded to the *south* in lat. 78° by the Weddell Sea, which is a little puzzling. Westward it is stated to be fringed by a barrier, which has been named the Kaiser Wilhelm barrier, while it continues (or was followed?) to 79° S. Lieutenant Filchner expresses his determination to return to the Antarctic in December to complete his explorations.

General.

The Royal Geographical Society and Women Fellows.—At a meeting of Fellows of the Royal Geographical Society of London, held

on January 15, it was proposed by the President, Lord Curzon, that women should be eligible as Fellows. On a vote the motion was passed by 130 votes to 51. A previous referendum on the subject had given a majority of three to one. Henceforth, therefore, women will be eligible for the fellowship on the same terms as men.

Livingstone Centenary in Glasgow.—A meeting of a representative committee formed in Glasgow in connection with the celebration of the coming centenary of the birth of Dr. David Livingstone, was held in the City Chambers, Glasgow, on January 15 last. The Lord Provost presided, and among those present were Principal Sir Donald MacAlister, K.C.B.; Professor Gregory; Professor Glaister; Mr. Paul Rottenburg, LL.D.; Mr. Robert Gourlay, LL.D.; and other representatives of the various public bodies interested.

On the motion of Professor Glaister, seconded by the Rev. David Watson, it was unanimously agreed that a fund be inaugurated for the purpose of establishing a permanent memorial of Dr. Livingstone. After some discussion the following became the finding of the meeting:—

"That a Livingstone Centenary Memorial Fund be established for the promotion (1) of medical missionary work in Central Africa, especially in connection with the London Missionary Society, the Livingstonia Mission of the United Free Church, and the Blantyre Mission of the Church of Scotland, and towards the establishment of a Livingstone scholarship in Anderson's College Medical School for the training of medical missionaries; and (2) for the promotion of the scientific study of Geography in the University of Glasgow by the endowment of a Livingstone lectureship or professorship."

The Committee arranged that an appeal be issued to the public in the terms of this resolution, intending subscribers to be asked to indicate to which section of the memorial they desired their subscriptions to be allocated, and that where no such indication was given the committee be authorised to exercise their own discretion.

Among other arrangements which are being made in Glasgow for the celebration of the Centenary, it is announced that an afternoon gathering will be held in the University on Tuesday, March 18, at which an appreciation of Livingstone will be delivered by Professor Gregory. The Very Rev. Dr. M'Adam Muir has arranged also to hold a public service in the Cathedral on Wednesday afternoon, March 19, and the Corporation will give a civic reception in the City Chambers the same evening.

Society for Promotion of Nature Reserves.—In connection with the note in our last issue (p. 35) on the formation of a Nature Reserve at Blakeney Point in Norfolk, we notice that it is announced in the *Times* that a new society, called the Society for the Promotion of Nature Reserves, has just been founded with the following objects:—

1. To collect and collate information as to areas of land in the United Kingdom which retain their primitive conditions, and contain rare and local species liable

to extinction owing to building, drainage, and disafforestation, or in consequence of the cupidity of collectors. All such information to be treated as strictly confidential. 2. To prepare a scheme showing which areas should be secured. 3. To obtain these areas and hand them over to the National Trust, under such conditions as may be necessary. 4. To preserve for posterity as a national possession some part at least of our native land, its fauna, flora, and geological features. 5. To encourage the love of Nature, and to educate public opinion to a better knowledge of the value of Nature study.

The society exacts no subscription ; members are formally elected by invitation of the Executive Committee (marked with * below), and all interested are invited to communicate with the secretaries. The control of the society's affairs is in the hands of a representative council consisting at present of the following :—

President—The Right Hon. J. W. Lowther, M.P.; Dr. I. Bayley Balfour, F.R.S.; Sir E. H. Busk ; Francis Darwin, F.R.S. ; Dr. F. D. Drewitt ; * G. Claridge Druce ; Professor J. Bretland Farmer, F.R.S. ; L. Fletcher, F.R.S. ; The Right Hon. Sir Edward Grey, Bt., K.G., M.P. ; The Right Hon L. V. Harcourt, M.P. ; * Sir Robert Hunter, K.C.B. ; Lord Lucas ; * E. G. B. Meade-Waldo ; * The Hon. E. S. Montagu, M.P. ; The Earl of Plymouth, C.B. ; Professor E. B. Poulton, F.R.S. ; Sir David Prain, F.R.S. ; *The Hon. N. C. Rothschild ; * W. H. St. Quintin ; Dr. R. F. Scharff ; W. M. Webb. *Ex officio*—Hon. Treasurer, * C. E. Fagan, I.S.O. ; Hon. Secretaries * W. R. Ogilvie-Grant and the Hon. F. R. Henley.

The trustees of the British Museum have kindly given permission to the committee to use the Natural History Museum, Cromwell Road, London, S.W., as the temporary address of the society.

The formation of this society is part of a movement which has of late years being spreading widely in the civilised world, the attention of all those interested in nature having been drawn to the fact that many plants and animals are being wiped out, and many interesting natural phenomena destroyed, sometimes wantonly, sometimes inadvertently with the advance of "civilisation," the result being that the world is constantly growing poorer. Both in America and in many parts of the Continent efforts are being made to check this process by, among other methods, the formation of reserves. The wider objects of the movement may be gathered from the list given above of the objects of the new society.

New Type of Palæolithic Skull.—The discovery is announced, in a gravel deposit on Piltdown Common, Fletching, Sussex, of a human skull and mandible, apparently of Lower Pleistocene age, differing in many respects from the Neanderthal type. The find was described by Mr. Charles Dawson and Dr. Smith Woodward before the Geological Society in London in December last. In addition to the human remains the gravel contained "eoliths" of the same type as those found in Kent, two fragments of the molar teeth of a Pliocene elephant, and a part of the molar of a mastodon, together with teeth of hippopotamus, beaver, and horse, and early Palæolithic implements. The skull is remarkable for the thickness of the bones, the feeble development of the brow ridges, and the relatively high forehead. The back of the skull and the mandible are ape-like in character. The point of interest is thus that, while the skull is of a primitive type, the low forehead and heavy brow

ridges of Neanderthal men are absent. The idea that modern man rose directly from the Neanderthal type has always presented certain difficulties, and Dr. Smith Woodward inclines to the view that Neanderthal man was a degenerate offshoot of primitive man and became extinct early, while the new remains may be those of a direct ancestor of modern man.

The Location of Icebergs.—In vol. xxviii. p. 546, we gave some account of Professor Howard Barnes' observations on the changes in temperature in sea water produced by the approach of icebergs. In a letter to *Nature* of 12th December last Professor Barnes describes his further observations during the past summer, as a result of which his previous conclusions have been slightly modified. He spent three weeks making observations in the Straits of Belle Isle, the ss. *Montcalm* having been placed at his disposal by the Canadian Government, and found, contrary to the earlier observations, that there was always a slight rise in temperature of the water near the iceberg, the fall previously observed close to the ice being absent. He is of opinion that this fall, when present, is due to cold arctic water in which the ice is floating, and not to ice-melting. Professor Barnes now holds that only two of the three Pettersson currents are caused by the melting of icebergs—the one a downward current which carries off the cold melt-water, and the other a horizontal one which brings warm surface water towards the ice. This surface water is warm, because it is withdrawn from the ordinary vertical circulation which cools sea water. Thus an iceberg automatically causes its own destruction by drawing warm water towards itself. The proximity of land, according to Professor Barnes, causes a fall of temperature, owing to the way in which the land turns up the colder under-water.

It will be seen from the above that Professor Barnes has somewhat modified his earlier views, and certain difficulties still remain. A long letter, pointing out some of these difficulties, and describing some laboratory experiments in ice-melting, is contributed to *Nature* of January 9, by Dr. John Aitkin. The subject is clearly one in regard to which further investigation is required.

Proposed Institute of Geography at Paris.—It is announced that the Marquise Arconati-Visconti, who has already presented a sum of £20,000 to the University of Paris, to be devoted "to the benefit of the Faculties of Science and Letters," has supplemented this gift by another of like amount. The Council of the University has resolved to use the money for the erection of an Institute of Geography to be built by the side of the Oceanographical Institute, which, it will be remembered, was endowed by the Prince of Monaco.

Geography and the India Police Force.—It is announced that the Secretary of State for India in Council has decided to modify the scheme of the competitive examination, held under the direction of the Civil Service Commissioners, for admission to the India Police Force, by requiring candidates to take up English history and geography as a

compulsory subject. The change will come into operation for the examination of 1914.

Medical Science among Primitive Peoples.—In connection with the International Medical Congress, which is to meet in London in the summer of this year, Mr. Henry Wellcome is organising a Historical Medical Museum, intended to illustrate the development of medicine, surgery, pharmacy, and the allied sciences. A special feature is to be the exhibition of charms, amulets and talismans connected with the art of healing among primitive and savage races, as well as specimens of their surgical instruments, and exhibits of plants, etc., used in medicine. All those who have objects of this kind in their possession, and are willing to lend them, are requested to communicate with the Secretary, 54A Wigmore Street, London. W.

EDUCATIONAL.

The School Atlas.—The late Professor Karl Hüttl contributes to the *Kartographische u. Schulgeographische Zeitschrift* a critical article upon the atlases in use in Austrian schools, with a discussion of the ideal school atlas. The analyses of the various atlases have, of course, little significance for us, but the general discussion is of considerable interest. The author is of opinion that the school atlas should illustrate what he calls the three parts of geography—the astronomical, the physical, and the political, the first two being far more important than the last. He states, and the statement is probably true of our school atlases also, that the first branch of the subject is for the most part very inadequately treated. In some cases astronomical maps are entirely absent, in others the scale is too small, and the facts are represented in too unsystematic a manner to be of any use to the scholar. On the other hand, many sides of physical geography are fully treated, a statement borne out by the analyses given of the Austrian school atlases. We gather that in these respects the atlases are in advance of our own, for such plates as those illustrating contrasts between glaciated and non-glaciated mountains, karst phenomena, onset of spring in Europe, etc., etc., must be at least rare in our school atlases. But while recognising the merits of the national atlases from the physical standpoint, the author makes an energetic appeal for a combination of pictures with the plates of the atlas. Hachuring, he says, is absolutely useless for the representation of land forms for children, and he would have all physical maps of every kind accompanied by pictures, profiles, sketches, etc., in order to render the phenomena represented real and vivid. The political maps should be restricted in number as far as possible, and be drawn with a prudent limitation of detail. On the other hand regions of special importance, such as the Rhine, the Ardennes, Upper Italy, the part of the North Sea upon which England, the Netherlands, Belgium and France abut, California, etc., etc., should

be illustrated by large scale maps. There should also be good ethnographic maps, accompanied by pictures showing the different peoples, their natural surroundings and their cultural conditions. Finally, a concluding map showing the great commercial routes over land and sea should be inserted.

In the arrangement of the atlas the standpoint and the needs of the adult should be definitely abandoned, and the whole arranged progressively, so as, first, to give the scholar vivid impressions of the chief facts of geography, and, second, to train him gradually to use and understand the highly abstract map. Thus no means of rendering the representations vivid should be neglected.

The article—though we do not know to what extent its recommendations can be carried out—seems to us of interest in that it is an attempt to apply to the atlas those principles which have now become a commonplace in regard to the geographical text-book. The old school-book of geography, it is not too much to say, was at best an abbreviated and summarised gazetteer: it contained solid facts to be assimilated by the scholar as he could, or, if not assimilated, at least swallowed. The old school atlas (and to some extent the existing one also) was a reduced and cheapened library atlas. Professor Hüttl, however, says openly and boldly that the needs of the traveller, the engineer, the soldier, the scholar, are not those of the school child, and the school atlas must be an entirely independent compilation.

Geographical Section of the Royal Philosophical Society of Glasgow.—This section has entered upon another session of successful work. Before Christmas the two following papers were delivered: "The Geography, Natural History and People of Southern Nigeria" (illustrated by views, native songs and choruses), by Mr. A. E. Kitson, F.G.S., F.R.G.S.; "The Uses of Place Names in the Teaching of Geography," by Mr. Jas. A. Ramsay, M.A.; while the other four items on the syllabus are as follows: *Thursday, 23rd January*—"The Roman Conquest and Occupation of Britain, Geographically Considered," by Mr. S. M. Miller, M.A. *Wednesday, 12th February* (Meeting of the Society)—"Scottish Scenery as shown in Ordnance Survey Maps," by Miss M. I. Newbigin, D.Sc. *Thursday, 6th March*—"The Whangie and its Origin," by Mr. G. W. Tyrell, M.A., B.Sc.; and "Civilisation as determined by Geographical Conditions," by Mr. Thos. W. M'Cance, M.A., B.Sc. *Thursday, 24th April*—"British Warfare in North America," by Mr. Thos. M'Michael, M.A., B.Sc. A conducted excursion is also to be arranged for a Saturday in May.

NEW BOOKS.

EUROPE.

The Gateway of Scotland; or East Lothian, Lammermoor, and the Merse. By A. G. Bradley. Illustrated with 8 coloured plates and numerous line drawings by A. L. Collins. London: Constable and Co., Ltd., 1912. *Price* 10*s.* 6*d. net.*

When one examines the list of the author's previously published works, one is led to expect a "made" book, but one does not read very far into *The Gateway of Scotland* before the half-formed prejudice is entirely dispelled. There are throughout abundant signs that Mr. Bradley has not only studied his district thoroughly, but is imbued with its peculiar spirit, and is inspired with a genuine affection for his subject. The explanation seems to be, as he himself hints, that East Lothian is his "calf" country, or at least that he knew it well in his youth, and has in his later survey retained much of that early glamour. The reminiscent, pleasantly garrulous vein which runs throughout must indeed charm readers—and we hope there are still many—who like to wander in by-paths. Yet that is not all. Mr. Bradley has a real sense of the value of a landscape, and the power of conveying to his audience an essentially true picture. This cannot be done by methods of compilation alone, but by loving study of the ground itself. For example, we may refer to the admirable treatment of East Lothian agriculture. Messrs. Constable are to be congratulated upon the general appearance of the book, and especially for their enterprise in illustrating it with line-drawings and the beautiful and suggestive sketches in colour by Mr. Collins.

Through Holland in the "Vivette." By E. Keble Chatterton. London: Seeley, Service and Co., Limited, 1913. *Price* 6*s. net.*

The friendly reception which the public gave to Mr. Chatterton's *Down Channel in the "Vivette"* (*S.G.M.*, vol. xxvii. p. 45), has induced him to publish the volume now before us, in which he tells of another cruise in the *Vivette* from Southampton to Calais, thence to Flushing, and on through the interior of Holland to Amsterdam, where the *Vivette* was laid up for the winter. Mr. Chatterton and Mr. Norman S. Carr, who had been at once the mate, artist, and ship's cook of the expedition, returned to England. They rejoined the *Vivette* in July of the following year, and sailed back from Amsterdam *via* Haarlem and Brassemer Meer to Gowre, where they picked up and retraced the route of the previous year to Flushing and across to Calais and Dover. They had a most enjoyable time, and received much courtesy and assistance from fellow yachtsmen and the inhabitants of the places where they halted. The only dangers they encountered were from bad weather and carelessness, which might at times have resulted in a collision, in which their four-ton yacht was certain to have come to grief. This breezily and crisply written book appeals especially to yachtsmen, and has been cleverly illustrated by Mr. Carr.

The Brenner Pass: Tirol from Kufstein to Riva. By Constance Leigh Clare. Illustrations by J. F. Leigh Clare. London: J. and J. Bennett, Ltd., 1912. *Price* 6*s. net.*

The Brenner Pass has from its nature and geographical position always been one of the great thoroughfares from Northern Europe into Italy, both in peace and war. Indeed, almost within the memory of living persons, before the advent

of railways, travellers from Venice on their way north used to post through the Brenner Pass. Historically, therefore, it is of supreme interest. Tourists who are in the habit of hurrying through to the Süd Tirol would do well to linger on the route so ably described by the author. One of the most interesting chapters describes the stirring and pathetic episode of Andreas Hofer, a struggle which excited the sympathy of Great Britain at the time, and which will never be forgotten. That part of the country which is sacred to his memory, the Passeierthal, is also unusually attractive for many reasons. For many centuries the great trade route ran from Sterzing through this pass to Meran and so to Bozen, and the vestiges of this traffic remain to this day, both in the buildings and in the physique of the people. There is one point which will be new to some readers. The picturesque processions of "Banner wavers," so familiar to those who visit Siena, have their counterpart in the Burggrafenamt as the *Fahnenschwingen*. The illustrations are excellent and in keeping with the text.

ASIA.

Une Colonie Modèle. La Birmanie. Par JOSEPH DAUTREMER, Consul de France. Paris: E. Guilmoto, N.D. *Prix* 6 *francs.*

M. Dautremer was French consul at Rangoon from 1904 to 1908, and in this interesting work he gives us his impressions of the general results of the British occupation of Burma. It was formally and finally annexed by Lord Dufferin in 1885, not much more than quarter of a century ago; then it was a semi-civilised country cursed by all the miseries resulting from the vagaries and eccentricities of a more or less insane and irresponsible despot: now it is peaceful, contented, and rich, in a word, a model colony, which compares favourably with any province in the Indian empire. In his exposition of this transformation M. Dautremer, after a brief sketch of the previous history of Burma, enters upon a description of the various races which inhabit it, its geography, administration, communications, resources, products, trade, etc., and we may remark, in passing, that, unlike some other French authors, he has been careful to avail himself of the latest statistics. From various passages in the book we gather that one object on the part of the author is to arouse reflection in France, and to evoke comparison with the French administration in the adjoining Cochin-China. M. Dautremer is quite frank in his exposition of the errors which he finds in the French colony. They have been often pointed out, *e.g.* the continuous and unnecessary changes of officials, their consequent ignorance of the language and the people, the mistaken parsimony of the home government which does not expend the capital necessary to develop the resources of the country, and M. Dautremer adds another on which he lays considerable stress, viz., the difference in the personal habits of the administrators. "L'Anglais," he says, "n'est ni plus intelligent, ni plus travailleur que les autres, mais il est doué d'un merveilleux esprit d'organisation, lequel, accompagné d'une grande audace en affaires, lui assure des résultats abondants et solides là où d'autres ne récoltent la plupart du temps que des déboires. Je dis que l'Anglais n'est pas plus travailleur que les autres, mais son travail est fait consciencieusement, et depuis le moindre des agents de la couronne jusqu'au gouverneur, depuis le moindre employé de bureau jusqu'au chef de maison, tout le monde accomplit sa tâche quotidienne avec la plus grande sincérité et la plus scrupuleuse exactitude; organisation bien comprise, travail méthodique, patience à toute épreuve, énergie remarquable dans les à-coups qui se produisent ici comme ailleurs, tel est le secret de la puissance anglaise dans le monde qu'elle enserre de mille liens divers." Burma is indeed, in his estimation, a model colony, but it is

by no means perfect, and he sets forth fearlessly from time to time what he thinks flaws or deficiencies in the administration. For this reason it is to be hoped that his work will find many readers in Rangoon and Simla as well as in Paris. We commend it to our readers.

The Holy City (Benares). With 58 illustrations and a map. By Rajani Ranjan Sen. Chittagong: 1912. *Price Rs.* 3.

Smiling Benares. Containing a sketch from the Vedic days to the Modern Times. With many illustrations and a map of Benares and its Environs. By K. S. Muthiah and Co. Madras : 1911.

These books give two Indian views of the sacred city, and despite the difficulties of a language foreign to the authors, both succeed in giving a vivid presentation of its beauty and charm. It is the spiritual rather than the material which appeals to Mr. Sen, and though his book is written in the form of a guide he is at his best in his accounts of the legends which cluster round the holy men of the city. Some of the legends which he re-tells are full of charm and poetry, and he closes his chapter on Myths and Annals with this delightful little touch :—"And even in the deep hours of night, pious people are met with going along the river-bank with loads of eatables in search of the hungry poor who might need them, and calling out 'Koi bhuka hai ?'—Is there any one hungry ?"

Smiling Benares is a "Coronation Souvenir," and gives a detailed account of the city, illustrated by many photographs.

Stewart's Tourist's Guide to the Far East: From Southampton to Tokio. London : Raphael's Ltd., 1912. *Price* 2*s.* 6*d.*

This book, which is copiously interleaved with advertisements, gives a detailed account of the sea journey from Southampton to Ceylon, followed by brief descriptions of the parts of the far eastern countries most frequently visited. A considerable amount of practical information is given.

AFRICA.

Among Congo Cannibals: Experiences, Impressions, and Adventures during a Thirty Years' Sojourn amongst the Boloki and other Congo Tribes, with a Description of their curious Habits, Customs, Religion, and Laws. By John H. Weeks. London : Seeley, Service and Co., 1912. *Price* 16*s. net.*

In 1890 the Baptist Missionary Society had three stations on the Upper Congo,—one at Bolobo, about 200 miles above Stanley Pool, another at Lukolele, a little over 100 miles further on, and a third at Bopoto, more than 400 miles beyond Lukolele. It was thought advisable to plant a new station somewhere midway between Lukolele and Bopoto, among the Bangalas, a Bantu tribe, reputed to be a race of cannibals, strong, warlike, and cruel ; and Monsembe was the district eventually selected. It is of the Bangalas of this district, whom the author prefers to call Boloki, that the book under review gives an account. The author is a missionary. He deals, however, not with missionary effort, but with the manners and customs of the people amongst whom he has resided for the last fifteen years ; and we may say without further preface that he has produced a work of great interest and value.

The natives, on being assured that the new-comers were unarmed, received them willingly : and their permanent goodwill was gained by the distribution of a

few presents. The authorities of the Congo Free State had given their sanction to the occupation by the missionaries of any plot of land suitable for their purposes. The latter, however, thought it better to treat with the actual owners; and accordingly they purchased a site and built a house. Gradually they overcame the difficulties of the language. Gradually, too, by their good sense and calm courage they dissipated the distrust of the natives.

The Boloki are a fine race. Their physical powers are highly developed. They can carry heavy loads across broken country, or paddle a heavy canoe hour after hour without much sign of fatigue. They have well-trained memories, and are keen and minute observers. They can adapt themselves to their surroundings, and possess a remarkable faculty for imitation. But they lack power of concentration or initiative. They will not, metaphorically speaking, follow a line of thought "for twenty yards." "Up to the age of fourteen or fifteen the boys and girls—especially the boys—are very receptive, and are easily taught; but after that age comparatively few make real advance in learning." The author suggests, as an explanation of this characteristic, that by that age the Congo boy has learned all that his father has to teach, and is content to keep to the old ways of parental practice or custom. A further explanation of their mental stagnation seems to be supplied by what is said of the influence of the "witch-doctor." "Before our arrival the 'witch-doctor,' by threats of 'witchcraft,' killed every aspiration of the people and smothered every sign of inventive genius that exhibited itself. To make anything out of the ordinary—any new article—was to be regarded as a 'witch,' and trouble was sure to follow any suspicions of that kind."

The Boloki man is sociable and kindly. He will attend to his sick relative or friend and nurse him faithfully. At the same time he is subject to outbursts of passion, during which he is capable of reckless cruelty. His affections are inconstant. He is neither a good lover nor a good hater. He is not without gratitude, but fears to show it for fear of being asked for favours. He is scrupulously fair in his division of meat or cloth among those who are entitled to a share, but he is niggardly to those who have no such right. He is innately selfish and gives only that he may receive the more in return. He does not consider it disgraceful to lie or to thieve, unless the lie or the theft be discovered. At the same time he is proud—"Touch his pride and he will act as though he were *un grand seigneur*." At the time of the missionaries' arrival the people were cannibals, and the horrors attending the practice were brought within their presence on several occasions. Widows were buried alive with their deceased husbands, and slaves were killed and interred with their dead masters.

The Boloki is a born trader, and, as a boy, he accompanies his father on all his trading expeditions. He learns in his village the relative values of things, and thoroughly enjoys the business of barter. Yet, strange to say, there are no markets in the country. If a Boloki has something to sell he hawks it through the town. If the owner of an animal wishes to sell its flesh, he cuts it up leaving a piece of skin on each portion so that the intending purchaser can tell whether it is taboo to him or not; and the man who has caught a fish tabooed to him seeks to barter it for something he can eat. Every kind of food is taboo to some one, and this prohibition may be due to various causes. The witch-doctor may have forbidden his patient to eat of a certain sort of food; or a family may not eat of a certain animal because it is their totem; or a permanent taboo may be put upon a particular kind of animal or fish or fruit.

In this connection it may be observed that when a free woman marries she observes not only her own but her husband's totem; and, when a child is born of the marriage, it takes the totems of both parents, until a family council, composed

of members of both sides of the house, decides which it shall observe for the future. In the author's opinion Totemism is generally dying out on the Congo.

Artificial relationship in the form of milk-brotherhood and milk-sisterhood is recognised among this people ; and, while it does not constitute a marriage bar, public opinion regards the union of milk-brother with milk-sister as very irregular. Peace is concluded by "making brothers"—the tie being strengthened by the imposition of taboos, a disregard of which would be to court some great disaster or even death.

The avoidance by a man of his mother-in-law, and by a woman of her father-in-law, is a recognised practice.

What is said of the native songs is of great interest. They may be divided into three classes—topical songs, sung in canoes for the purpose of distributing news ; songs at funeral ceremonies, in which the praises of the dead are sung ; and songs in which the qualities of the men and women of a town or village are published to all and sundry. The canoe songs serve to warn a village of the approach of friends, and recall to us the signals of approach given in many parts of the world by means of blast of trumpet, or beat of drum, or ceremonial coughing. The songs which record the characters of men and women, their bravery or cowardice, generosity or meanness, etc., etc., remind us, in a way, of the Eskimo Nith-songs. They exercise a great popular influence ; for there is nothing which affects the African more than being praised or ridiculed in a song.

The book contains many interesting chapters regarding the arts of the Boloki, their marriage and burial customs, their methods of hunting and fishing and making war, their mythology, and their religious notions. In regard to the latter it may be said that while they have some vague idea of a Supreme Being, their system of belief is based on their fear of malignant spirits, infinitely numerous, which seek to compass their sickness, misfortune, or death, and which can be appeased or cajoled or forced only by means of witch-doctor and fetish.

A serviceable map and index are included in the volume.

We have read Mr. Week's book with unflagging interest, and take leave of it with a feeling of gratitude not only for the information which it contains, but for the admirable manner in which that information is conveyed.

Livingstone and the Exploration of Central Africa. By Sir H. H. Johnston. With numerous illustrations. London : G. Philip and Son, n.d. *Price* 1*s. net.*

This is a cheap reprint of the volume which Sir Harry Johnston contributed to "The World's Great Explorers" series, and has been prepared in connection with the approaching centenary of the birth of David Livingstone.

My Sudan Year. By E. S. Stevens. London : Mills and Boon, Ltd., 1912. *Price* 10*s.* 6*d. net.*

Few of us have even comparatively accurate ideas of the size and resources of the Sudan. We are told it is about two-thirds of the size of the Chinese empire, or that it has an area of more than a million square miles, but it has to be confessed that such a description does not go far to enlighten the ordinary reader. But it will suffice to explain, how, in her Sudan year (which was in reality by no means a whole year), Miss Stevens was able to see only a small part of the Sudan, but what she did see she describes in attractive and graphic style. We have, of course, descriptions of Khartoum and Omdurman with ever-exciting reminiscences, clustering around the names of Gordon, Kitchener, Slatin Pasha, and Father Ohrwalder, but the greater part of the book is taken up with the story of

a sail from Khartoum up the Nile to the Sudd and back, rather a monotonous journey, in which almost the only distractions were the insects and occasional short expeditions for sport. But Miss Stevens is a careful and watchful observer, and her narrative is full of shrewd and instructive observations of the conditions, manners, customs, religion, folklore, legends, superstitions, dress (and want of dress), etc., of the many tribes whom she saw *en route*. A perusal of this book will go far to explain to us the difficulties and delicacy of the task undertaken by Great Britain in the civilisation of the Sudan, which, it has to be confessed, are in some ways greater than those we had to encounter when we annexed province after province of India. A particularly interesting chapter is one in which Miss Stevens gives translations of several characteristic Sudanese songs, and mention should also be made of her interesting notes on the bird and plant life of the Nile. Like others who have travelled in the Sudan, she takes a sanguine view of its future. It requires a large influx of capital to ensure irrigation, and of imported labour to till the soil, imported because the native population is evidently most disinclined to undertake regular field work. But, given irrigation and labour, the Sudan could produce an enormous amount of excellent cotton, equal to any we now get from India or America. The Sudan is a vast untilled garden. A word of commendation is due to the photographic illustrations.

AMERICA.

Florida Trails as seen from Jacksonville to Key West and from November to April inclusive. By WINTHROP PACKARD. Illustrated from photographs by the Author and others. London: Frank Palmer, 1912. *Price 7s. 6d. net.*

To visit such a country as Florida must be a pleasure in any circumstances, but to go in the company of Mr. Packard is something to live for. For besides being a poet by instinct, he is a trained botanist and naturalist, and is able to make one see not only what he himself sees, but the fairylike interpretations which he dreams. Human beings do not interest him, he "has no use" for them, but with the forest and its birds and flowers he is thoroughly at home. From the time the steamer leaves the north the birds follow in their hundreds, "far exceeding the paying passenger list," an escort varying in character from the northern gull to the pelican in the south, and all perfectly at home. There is a tale of a Myrtle Warbler which settled on the hat of a negro, and laid an egg there, "Yes, sir, it done did." Certainly one wonders why our American friends, with a paradise like Florida so near them, should ever stray across the Atlantic. In one touch of human nature he does mention Mrs. Beecher Stowe, who lived there, and did so much for freedom. Now there is nothing left of her dwelling, but freedom is in the air, for not only the negro but the wild bird is free. It seems that in Florida it is forbidden to cage wild birds. It would have been helpful to British readers had there been some sort of a glossary of the local popular names of the plants and birds. The illustrations are very beautiful.

AUSTRALASIA.

Travels in Australasia. By WANDANDIAN. Birmingham: Cornish Brothers, Ltd., Publishers to the University, 1912. *Price 5s. net.*

The author conceals his identity under the pseudonym of "Wandandian," a native Australian word meaning "a home for lost lovers," and applied to an inlet of St. George's Lake, in New South Wales. His profession or hobby is that of collector of insectivora to which he added later that of birds. In these pursuits

he spent considerable periods at various places, and during his four years' sojourn became acquainted with many regions from South Australia to North Queensland, including Tasmania and New Guinea. A brief visit was paid to the Solomon Islands, Tonga, Samoa, and Fiji. A chapter is devoted to a "few Australian problems," notably that of "White Australia," on which the author is not afraid to express decided opinions. We presume it is useless to protest against his arrogant assumption to his own home political party of the sole possession of patriotism. The author is obviously a trained observer, and his descriptions provide a very illuminating series of pictures of Australian conditions. The printing of the book is distinctly unworthy of a firm which publishes to a University. On page 63 a line is partially duplicated, and another is omitted, the spacing throughout is very irregular, and towards the end the lines are closer together than elsewhere. On page 386 there are thirty-eight lines and on page 387 there are forty-one. There is no index.

EDUCATIONAL.

Map Projections. By Arthur R. Hinks, M.A. Cambridge: University Press, 1912. *Price 5s. net.*

This book may be said to occupy a place intermediate to the works of Hughes and Morrison, which are more or less popular discussions on the subject of Map Projections, and the more mathematical article of Clarke in the *Encyclopædia Britannica*. It is intended principally for map-users, yet map-makers will also find it serviceable. In six chapters the author gives a general description of the principal projections, while in the eighth the mathematics necessary for their construction are considered. The seventh chapter is perhaps the most interesting, dealing, as it does, not with construction, but with such matters as projections employed in actual maps, and their identification and choice.

While several books and articles on Map Projections have appeared within the last few years, and in spite of the fact that the subject appeals to but a limited number, Mr. Hinks's book amply justifies its publication. One matter alone leaves something to be desired—the tables at the end. Suitable as these no doubt are for general purposes, when considered from the map-maker's standpoint a regret may be expressed that the author has not made them fuller and more complete. Otherwise the book could scarcely be improved on, and even in regard to this it must be remembered that, as has been said, the book is primarily intended for map-users, for whom the tables are an improvement on what has appeared in former popular text-books. Altogether, as a book suitable for general use, Mr. Hinks's *Map Projections* is probably the best that has yet appeared in English.

Highroads of Geography: Book IV. The Continent of Europe; Book V. Britain Overseas. London: Thomas Nelson and Sons, 1912. *Price 1s. 6d. net each.*

These are reading-books of the journey type, copiously illustrated with coloured and uncoloured pictures. Book V. has no author's name on its title-page, while many authors have combined to produce Book V. under the general editorship of Sir J. Parrott. We presume, from internal evidence, that the authors in this latter book have been elected because of their own detailed acquaintance with the separate regions described, but the result is that far more details are supplied than can be assimilated by the scholar. This is especially the case when, as often happens, the details given are illustrated neither on the relief maps nor in the

pictures, and we do not envy the task of the conscientious teacher, who will require many Baedekers, a continental Bradshaw, with maps and guide-books galore, to explain or illustrate the casual allusions of the text. Further, it seems to us that, in many cases, tourist fashion, minor incidents and details are given the prominence which should have been reserved for facts of genuine geographic interest. Book V. is devoted to a rather journalistic description of the British Empire.

Business Geography. By J. Hamilton Birrell. London: Ralph Holland and Co., 1912. *Price* 1*s.* 6*d. net.*

A useful though greatly condensed little book, intended to serve as an introduction to commercial geography. It has a number of diagrams and simple sketch-maps, and gives references which will enable those interested to pursue the subject further.

Regional Geographies: The World. By J. B. Reynolds, B.A. London: A. and C. Black, 1912. *Price* 3*s.* 6*d.*

This is an excellent and comprehensive book, illustrated by a number of clear and useful maps and diagrams. It is arranged progressively, the later sections being somewhat more advanced than the earlier ones.

The Elementary Geography: Vol. VI. The Three Southern Continents. Price 1*s.* 9*d. Vol. V. North and Central America and the West Indies. Price* 1*s.* 6*d.* By F. D. Herbertson. The Oxford Geographies. Edited by A. J. Herbertson. Oxford: At the Clarendon Press, 1912.

Mrs. Herbertson's *Elementary Geography* has already found its public, and these two additional volumes will be cordially welcomed. The carefully annotated illustrations are an excellent feature.

GENERAL.

Lehrbuch der Dänischen Sprache zum selbst. Unterricht. Von J. C. Poestion. Wien und Leipzig: Hartleben, 1912. *Price M.* 2.

A useful little book on the Danish language, in German, intended for use without a teacher. The usefulness is shown by the fact that this is the third edition, and that the book has been extensively used in university teaching. The present issue has been thoroughly revised and modified. It is noted as a curious fact that recently the Danish language has shown signs of undergoing modification in the direction of a *rapprochement* between the popular and the literary forms of speech, which were, even till the end of last century, markedly contrasted with each other.

Missions: Their Rise and Development. By Louise Creighton. Home University Library. London: Williams and Norgate, 1912. *Price* 1*s.*

The editor of this series has done well to entrust the volume on missions to the widow of the late Bishop of London, herself a member of the Continuation Committee of the World Missionary Conference. Her useful work surveys the whole history of Christian missions, including to some extent Roman Catholic missions, from their commencement, and is replete with information and sound views on the subject. Withal it is well written. We learn with interest that the first recorded donation in England to the cause of foreign missions was Sir Walter Raleigh's £100 given for work in Virginia.

Hazell's Annual, 1913. Edited by HAMMOND HALL. London: Hazell, Watson and Viney, 1913. *Price* 3*s.* 6*d. net.*

Whitaker's Almanack, 1913. By JOSEPH WHITAKER. London. *Price* 2*s.* 6*d.*

The International Whitaker. London, 1912. *Price* 2*s. net.*

Whitaker's Peerage, Baronetage, Knightage, and Companionage, 1913. London. *Price* 5*s. net.*

Daily Mail Year-Book, 1913. Edited by DAVID WILLIAMSON. London: Associated Newspapers. 6*d. net.*

The beginning of the year brings the usual crop of annuals, etc. Among the newcomers we notice the *International Whitaker*, which is addressed "to the 200,000,000 English-reading people of the world," and treats the different countries on more or less uniform lines. *Hazell's Annual*—a useful production—contains as usual summaries of scientific progress during the year, good accounts being given of the various Arctic and Antarctic expeditions, while the meeting of the British Association at Dundee is briefly described. In the very cheap *Daily Mail Year-Book* we have what it is customary to call a marvel of journalistic enterprise in which the fastidious will see various points which might be criticised, though the book has evidently its public. To *Whitaker's Almanack* Mr. Edward Heawood contributes a valuable article, illustrated by sketch maps, on "Geographical Progress and Territorial Changes, 1911-12," and the volume shows its other usual features, having new articles on matters of current interest.

BOOKS RECEIVED.

Lost in the Arctic: Being the Story of the Alabama *Expedition 1909-1912.* By EJNAR MIKKELSEN, with numerous Illustrations and a Map. Crown 4to. Pp. xviii + 395. *Price* 18*s. net.* London: William Heinemann, 1913.

The Land of Zinj: Being an Account of British East Africa, its Ancient History and Present Inhabitants. By Captain G. H. STIGAND. Demy 8vo. Pp. xii + 351. *Price* 15*s. net.* London: Constable and Co., Ltd., 1913.

Greater Rome and Greater Britain. By Sir C. P. LUCAS, K.C.B., K.C.M.G. Demy 8vo. Pp. 184. *Price* 3*s.* 6*d. net.* Oxford: Clarendon Press, 1912.

A New Account of East India and Persia: Being Nine Years' Travels, 1672-1681. By JOHN FRYER. Edited, with Notes and an Introduction, by WILLIAM CROOKE, B.A. Vol. II. Demy 8vo. Pp. 371. London: Hakluyt Society, 1912.

Travellers' Practical Manual of Conversation, No. 2, *in English, French, German and Dutch (Holland and the Rhine).* Subjects arranged alphabetically. Pp. 144. *Price* 1*s.* 6*d.* London: E. Marlborough and Co., 1912.

Norwegian Self-Taught, with Phonetic Pronunciation. By C. A. THIMM. Revised and Enlarged by P. TH. HANSSEN. Fifth Edition. Crown 8vo. Pp. 128. *Price* 2*s.* 6*d.*

Portuguese Self-Taught (Thimm's System), with Phonetic Pronunciation. By E. DA CUNHA. Second Edition, Revised. Crown 8vo. Pp. 120. *Price* 2*s.* 6*d.* London: E. Marlborough and Co., 1912.

Northern Italy, including Leghorn, Florence, Ravenna and Routes through France, Switzerland, and Austria. Handbook for Travellers. By KARL BAEDEKER. With 36 Maps, 45 Plans, and a Panorama. Fourteenth Remodelled

Edition. Crown 8vo. Pp. lxviii + 698. *Price* 8*s. net.* Leipzig : Karl Baedeker. 1913.

An Almanack for the Year of the Lord 1913. By Joseph Whitaker, F.S.A. Crown 8vo. Pp. v + 1034. *Price* 2*s.* 6*d.* London : Joseph Whitaker, 1912.

The International Whitaker. Crown 8vo. Pp. xlviii + 527. *Price* 2*s.* London : Joseph Whitaker, 1912.

Whitaker's Peerage, Baronetage, Knightage, and Companionage for the Year 1913. Crown 8vo. Pp. xvi + 854. *Price* 5*s. net.* London : Joseph Whitaker, 1912.

Hazell's Annual for 1913 : A Record of the Men and Movements of the Time. Edited by Hammond Hall. Twenty-Eighth Year of Issue. Crown 8vo. Pp. lxvi + 592. *Price* 3*s.* 6*d. net.* London : Hazell, Watson and Viney, Ltd., 1913.

Monumental Java. By J. T. Scheltema, M.A. With Illustrations, and Vignettes after Drawings of Javanese Chandi Ornament by the Author. Demy 8vo. Pp. xviii + 302. *Price* 12*s.* 6*d. net.* London : Macmillan and Co., Ltd. 1912.

The Fighting Spirit of Japan, and other Studies. By E. J. Harrison. With 35 Illustrations. Demy 8vo. Pp. 352. *Price* 12*s.* 6*d.* London : T. Fisher Unwin, 1912.

Die Sunda—Expedition des Vereins für Geographie und Statistik zu Frankfurt am Main. Von Dr. Johannes Elbert, Leiter der Expedition. Demy 4to. Pp. xv + 373. Frankfurt am Main : Hermann Minjon, 1912.

The River of London. By Hilaire Belloc. Crown 8vo. Pp. 145. *Price* 5*s. net.* Edinburgh : T. N. Foulis, 1912.

Latin America : Its Rise and Progress. By T. Garcia Calderon. With a Preface by Raymond Poincaré. Translated by Bernard Miall. With a Map and 34 Illustrations. Demy 8vo. Pp. 406. *Price* 10*s.* 6*d. net.* London : T. Fisher Unwin, 1912.

Twenty-Five Years in Qua Iboe : The Story of a Missionary Effort in Nigeria. By Robert L. M'Keown. Crown 8vo. Pp. vii + 170. *Price* 2*s.* 6*d.* London : Morgan and Scott, Ltd., 1912.

The Empire of India. By Sir Bampfylde Fuller, K.C.S.I., C.I.E. Demy 8vo. Pp. x + 393. *Price* 7*s.* 6*d. net.* London : Sir Isaac Pitman and Sons, Ltd., 1913.

The Guide to South and East Africa, for the use of Tourists, Sportsmen, Invalids and Settlers. With Coloured Maps, Plans, and Diagrams. Edited annually by A. Samler Brown and G. Gordon Brown, 1913. Nineteenth Edition. Crown 8vo. Pp. liv + 695. *Price* 1*s. net.* London : Sampson Low, Marston and Co., Ltd., 1913.

Commodore Sir John Hayes : His Voyage and Life (1767-1831) ; with some Account of Admiral D'Entrecasteaux's Voyage of 1792-3. By Ida Lee (Mrs. Charles Bruce Marriott). With Illustrations. Demy 8vo. Pp. xvi + 340. *Price* 7*s.* 6*d. net.* London : Longmans, Green and Co., 1912.

The Russian Year-Book for 1913. Compiled and edited by Howard P. Kennard, M.D., assisted by Netta Peacock. Crown 8vo. Pp. xx + 810. *Price* 10*s.* 6*d. net.* London : Eyre and Spottiswoode, Ltd., 1913.

Common Sense in Foreign Policy. By Sir Harry Johnston, G.C.M.G., K.C.B., D.Sc. Illustrated with Eight Maps by the Author and Dr. J. G. Bartholomew of the Geographical Institute, Edinburgh. Demy 8vo. Pp. x + 119. *Price* 2*s.* 6*d. net.* London : Smith, Elder and Co., 1913.

Wissenschaftliche Ergebnisse der Expedition Filchner nach China und Tibet, 1903-1905. II. Band. Bilder aus Kan-su. Von Wilhelm Filchner. Bear-

beitet von HERBERT MUELLER. Crown 4to. Pp. x + 157. *Preis M.* 20. Berlin: Ernst Siegfried Mittler und Sohn, 1912.

The Sea West of Spitsbergen: the Oceanographic Observations of the Isachsen Spitsbergen Expedition in 1910. By BJØRN HELLAND-HANSEN and FRIDTJOF NANSEN. With 6 Plates. Royal 8vo. Pp. 89. Christiania: Jacob Dybwad, 1912.

Memoirs of the Geological Survey, Scotland: the Geology of Ben Wyvis, Carn Chuinneag, Inchbae and the Surrounding Country, including Garve, Evanton, Alness and Kincardine. Explanation of Sheet 93. By B. N. PEACH, LL.D., F.R.S., the late W. GUNN, etc. With Petrological Contributions by J. S. FLETT, M.A., D.Sc. *Price* 4*s.* Edinburgh: Geological Survey, 1912.

Thinking Black: Twenty-Two Years without a Break in the Long Grass of Central Africa. By D. CRAWFORD, F.R.G.S. Demy 8vo. Pp. xvi + 503. *Price* 7*s.* 6*d. net.* London: Morgan and Scott, Ltd., 1912.

Doreen Coasting: with Some Account of the Places she saw and the People she encountered. Edited by ALYS LOWTH. With 125 Illustrations. Demy 8vo. Pp. xix + 294. *Price* 10*s.* 6*d. net.* London: Longmans, Green and Co., 1912.

Echoes from the Hills: being the Reminiscences of the late John Hyslop, J.P., Langholm. Edited by his son Robert Hyslop, F.S.A. (Scot.). Crown 8vo. Pp. xv + 357. *Price* 2*s.* 6*d. net.* Sunderland: Hill and Co., 1912.

Northern Germany as far as the Bavarian and Austrian Frontiers. Handbook for Travellers. By KARL BAEDEKER. With 54 Maps and 101 Plans. Sixteenth Revised Edition. Crown 8vo. Pp. xxxviii + 439. *Price* 8*s. net.* Leipzig: Karl Baedeker, 1913.

My Russian Year. By ROTHAY REYNOLDS. With 28 Illustrations. Demy 8vo. Pp. xii + 304. *Price* 10*s.* 6*d. net.* London: Mills and Boon Limited, 1913.

D'Alger à Tombouctou; Des rives de la Loire aux rives du Niger. Par Comte RENÉ LE MORE. Avec une carte. Deuxième Edition. Crown 8vo. Pp. 260. *Prix* 3 *fr.* 50. Paris: Plon-Nourrit et Cie, 1913.

Statistical Abstract for the British Empire in each Year from 1896 to 1910. *Price* 1*s.* 3*d.* London, 1912.

East India (Trade): Review of the Trade of India in 1910-11. *Price* 1*s.* 1*d.* London, 1911.

Sudan Almanac, 1913. *Price* 1*s.* London: His Majesty's Stationery Office, 1913.

Statistical Abstract for the Several British Self-governing Dominions, Crown Colonies, Possessions and Protectorates in each Year from 1897 to 1911. Forty-ninth Number. *Price* 1*s.* 10*d.* London, 1912.

Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions, 1911. Supplement to Volumes I. and II. *Price* 3*s.* 1*d.* London, 1912.

Verhandlungen des achtzehnten Deutschen Geographentages zu Innsbruck, vom 28 mai bis 2 Juni 1912. Herausgegeben von GEORG KOLLON. Mit 15 Abbildungen im Text. *Preis M.* 8. Berlin: Dietrich Reimer, 1912.

Publishers forwarding books for review will greatly oblige by marking the **price** *in clear figures, especially in the case of foreign books.*

NEW MAPS.

EUROPE.

ORDNANCE SURVEY OF SCOTLAND.—The following publications were issued from 1st to 31st October 1912 :—

Six-inch Maps (Revised). Quarter Sheets, with contours in blue. Price 1s. each. *Lanarkshire.*—21 NE., 21 SW., 21 SE., 38 SE., 49 SE. (52 NE. and 52 SE.), 53 SW.

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Note.—There are no coloured editions of these Sheets, and the unrevised impressions have been withdrawn from sale.

Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 2s. 6d. each. *Aberdeenshire.*—Sheet XLVI. 5 NE., SE. *Argyllshire.*—Sheet XCVIII. 11 NE. *Ayrshire.*—Sheets VIII. 8 SE. ; 9 NW. ; 12 NE. ; 15 NW. ; XII. 4 NE. ; 7 SW. ; XVI. 16 NE. ; XVII. 15 NW. ; 16 NW. ; XVIII. 15 SW. ; XIX. 13 SE. ; XXI. 16 SE. ; XXII. 7 SW. ; 14 NW. ; 16 NW. ; XXIII. 3 NW. ; XXVII. 7 SW. ; XXVIII. 12 NE. ; XXIX. 10 NW. ; 11 NW. ; XXXIII. 3 SW. ; 14 SW. ; XXXIV. 9 SE. ; 13 NE. ; XXXV. 3 SW. ; 8 SW. ; XXXVIII. 6 NE. ; XXXIX. 10 NW. ; XLII. 9 NE., SW., SE. ; XLIV. 10 SW., SE. ; XLV. 6 SE. ; 10 SW. ; 14 NW. ; 16 SW. ; XLVI. 1 NE. ; 6 SE. ; L. 2 NE. ; LI. 1 SW. ; LV. 8 NW. ; LVI. 12 SW. ; LXV. 12 NW., SW. ; LXVI. 2 NE. ; 3 NW. ; LXVII. 10 NE. *Dumbartonshire.*—Sheets XVII. 2 SW. ; 5 NW., NE. ; XVIII. 5 NE., SE. ; 6 NW., SW. ; 13 NE., SE. ; 14 NW. ; XXII. 2 SW., SE. ; 5 NE., SE. ; XXIII. 13 SW. *Dumfriesshire.*—Sheets VI. 10 NE., SE. ; VII. 2 SW. ; 6 NE. ; XIII. 4 NW. ; XIV. 11 SE. ; XXII. 10 NE., SE. ; XXX. 8 SW. ; 10 SE. ; 15 NW. ; 16 NW. ; XXXI. ; 1 SE. ; 6 SW. *Edinburghshire.*—Sheets III. 8 NW., NE., SW., SE. ; IV. 5 NE., SE. ; 6 NW., SW., SE. ; 11 NE. ; VII. 12 SE. ; VIII. 6 NE., SE. ; 7 NW., NE., SW. ; 9 NW., NE., SW., SE. *Elginshire.*—Sheets V. 12 NE. ; IX. 5 NW. ; 9 NW. *Fifeshire.*—Sheets VIII. 10 NW. ; XII. 4 SE. ; 8 NE. ; XIII. 13 NE., SE. ; XIV. 15 NE. ; 16 NW. ; XIX. 4 SW., SE. ; 8 NE. ; XX. 15 NE., SE. ; XXII. 9 NW., SW. ; 13 SW. ; 14 SE. ; 16 NW. ; XXVI. 16 NE., SE. ; XXVII. 4 NE. ; 14 SW. ; XXVIII. 2 SW., SE. ; 3 NW. ; 5 NE. ; XXX. 2 NW., NE. ; 5 NW. ; XXXIV. 4 NE., SE. ; 8 NE., SW., SE. ; XXXV. 5 NW., SW. *Haddingtonshire.*—Sheet X. 6 NE. *Inverness-shire.*—Sheets IV. 13 NW., NE., SW., SE. ; 14 SW., SE. ; XII. 1 NE., SW., SE. ; 2 NW., SW. ; 5 NE., SE. ; 6 NW., SW. *Kincardineshire.*—Sheets XXV. 15 NW., SW. ; XXVIII. 13 NE. *Kirkcudbrightshire.*—Sheets XVIII. 10 NE. ; 16 NW. ; XXVI. 3 NW. ; XXXV. 11 SW., SE. ; XXXIX. 3 SW. ; XLVII. 1 NW., SW. ; 9 SE. *Lanarkshire.*—Sheets I. 14 SE. ; VI. 13 NW. ; VII. 12 NE. ; 14 NE. ; VIII. 5 SW., SE. ; 6 SW., SE. ; 9 NW., NE., SW., SE. ; 13 NW. ; X. 3 SW. ; 7 SE. ; 8 NW., NE., SW., SE. ; 14 SE. ; XI. 3 SW. ; 5 NW., SW., SE. ; 7 NW., NE. ; 8 NE., SE. ; 11 NE., SW., SE. ; 14 NE., SE. ; 15 NW., NE., SW., SE. ; 16 SW. ; XII. 10 SW. ; XVII. 4 NW., NE., SW., SE. ; XVIII. 2 NE. ; XXIII. 15 NE. ; XXIV. 6 NW. ; XXXI. 8 SE. *Linlithgowshire.*—Sheets I. 8 NW., SW. ; V. 3 NW., NE., SW., SE. ; IX. 6 NW., NE., SW., SE. *Orkney.*—Sheets CVIII. 3 NW., NE., SW., SE. *Perthshire.*—Sheets LXIV. 13 NE. ; XCVIII. 1 SW., SE. ; 2 NW. ; 5 NW. ; NE., SW., SE. ; 6 SW. ; 9 NW., NE., SW., SE. ; XCIX. 7 SW. ; CXV. 13 SW. *Ross and Cromarty.*—Sheets LXXVI. 15 SW., SE. ; LXXXVIII. 3 NW., NE., SE. *Roxburghshire.*—Sheets IX. 4 SE. ; 8 NE. *Stirlingshire.*—Sheets XVII. 12 NW.,

NE., SW., SE. ; XXX. 2 NE., SE. *Wigtownshire.*—Sheets XXX. 7 SE. ; 11 NE. ; *Zetland.*—Sheets LIII. 9 SE. ; 14 NW., SW.

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The following publications were issued from 1st to 31st December 1912 :—

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THE SCOTTISH GEOGRAPHICAL MAGAZINE.

A NEW VIEW OF WEST AFRICA.[1]

By Mrs. Mary Gaunt.

(*With Illustrations.*)

You have, some of you, always heard West Africa spoken of as the land of miasma and fever, of swamp, heat, and mosquito, a land in fact to which no man would go willingly, a land to which he is driven by sheer necessity. That is the way I thought of West Africa before I went. It presents itself to me now in many pictures, sometimes lovely and entrancing, sometimes cruel and forbidding, but for the coast I think there will always come into my mind one, that of palms and sea and sky. I wish I could give you the blue of the sky, the deeper blue of the sea, the yellow sand, the white foam of the surf, the green of the graceful palms; could make you hear the whisper of the wind in the palm fronds, the crash of the surf as it meets the sand; could make you feel the freshness of the early morning, the languor and the heat of the midday, the glory of the tropical nights. It is a mistake to think that African nights are hot. They are not. So long as you remain in the open air they are simply delightful, and I have never, so long as I slept where the air could have free access, as on a verandah or out in the open, found one single night when I did not require to draw up a blanket over me before morning. Wherefore have I come to the conclusion that some of the ill-health in West Africa is due to a too strict adherence to British ways. "Pull down the blinds, light the lamp, and draw round the fire," is the British standard of comfort, and a very delightful standard it is in these colder latitudes, but the man who is going to try and apply it in a country like West Africa is courting

[1] An address delivered before the Royal Scottish Geographical Society in Aberdeen on December 3, 1912.

disaster. What he wants to enjoy there is the beauty and glory of the tropical night, and if he will only learn to appreciate that properly he will turn to good account the sixteen hours of pleasant temperature that are always his if he does not shut himself in too much. Then he will find that the eight hours of heat will trouble him far less. You must no more seek British modes of comfort in West Africa than you must expect British service. When you land on her coasts you have done with much of the mechanism to which you have been accustomed, and all your belongings are handled by man. The carrier is the most important factor in life on the coast. The time will come, I suppose, when we shall do away with him, but I am glad I have met him. Not once all along that coast did I meet a white man on the march, but there was traffic for all that, for certainly in the western half of the colony the seashore is the king's highway, and here the people, men, women and children, pass to and fro from one village to another bearing all their merchandise on their heads. Everything is carried on the head by these stalwart sons and daughters of Anak.

The people along the shore live by fishing, so that the launching and drawing up of a surf boat were everyday sights. Sometimes I would come across a great catch of fish, and then, though I could not speak their tongue, and was an object of great curiosity, the people always made the most of the occasion, and rummaged over the fish to show me those they thought the most remarkable. I could not but feel friendly when a gentleman, black, of course, and lightly and suitably clad in a scrap of rag, raised high over his head the thorny tail of a flat fish that was flapping about on the sand, and the others stood round pointing at it with long "ohs" and "ahs." Of course all the shore was dotted with the fishing-villages, and very dirty indeed they were, and dirtier and dirtier they grew as I travelled eastward, till I reached German territory, where their surprising cleanliness astonished me. As long as those villages are filthy I shall never be surprised that any town on the Gold Coast is quarantined for yellow fever. They must be the most excellent breeding-places for the yellow fever mosquito. They are every one within short water distance of the various towns, and we all know that a benevolent Government is very loath to interfere with the personal liberty of the native, even if it be the liberty to spread disease and death. It is a pity, for this is going to be a great country, though for all the years that we have held West Africa I think it is only in this century that we are beginning to recognise its immense possibilities. The head of the station at Tarkwa, looking out at the gold mines round him, declared emphatically to me that the agricultural wealth of the country was far in excess of any gold output, though he acknowledged that was by no means to be despised, and he took me round and showed me the glories and the beginnings of the garden over which he ruled. The rubber plantations are very picturesque, with their dark, almost gloomy foliaged trees, with the strong tropical sunlight streaming down the aisles between. The black man, left to himself, will gather rubber till the tree is exhausted and dies; so much experiment was entered into to find the best way of scoring the tree. These rubber plantations ought

to interest us deeply, for they are the beginning of what in the future I am convinced will be a very great industry.

People have said to me, "Of course you were well in West Africa, we all know the tourist never catches diseases," and then I, though they did not, asked myself "Why?" and of course found an answer easily

Tapping a rubber tree at Tarkwa.

enough. Providence does not make a tourist immune simply because he is a tourist. I think it is probably his state of mind, that of being interested and amused, that makes for health, so if we can interest and amuse the man who has to live in Africa we go far towards keeping him in good health,—but this is only by the way.

There are many other valuable products besides rubber that are grown at the Tarkwa Agricultural Station, and may be grown profitably all over the Gold Coast. Palm oil and cocoa and mahogany are staple

products, and also pineapples. It is necessary to keep the remembrance of the amazing fertility of the land in your thoughts when one looks at the native town of Tarkwa, for anything more hot and dreary and ugly it would be difficult to find. Though I am bound to admit the negro generally has a shade tree or two in his town if left to himself, he seems on the whole to have no idea of the beauty of growing green things, and I am sorry to say that many of the men who rule over him in the British colony do not seem to have any idea of it either. Bare ugly native houses, bare ugly shops with all the wares displayed outside, seem to be accounted good enough for the natives of a country of surpassingly beautiful vegetation, and I never shall forget being taken by the doctor who was superintending its buildings to see the new village that was going up for the miners of the Prestea mine. It was clean, that is all I can say for it. The streets were absolutely bare of shade trees in a land where for at least eight hours of the day nearly all the year round shade is the great desideratum. This, I was told, was done in the interests of health, because trees brought the mosquito. I would rather die of fever than sunstroke any day, and in the new mining village of Prestea sunstroke has been carefully arranged for. He was an energetic man, that doctor. In the European settlement he had converted, in his war against mosquitoes, a beautiful hill into one great raw red scar, where not even a blade of grass grew, and he had crowned it with corrugated iron-roofed buildings. Do you wonder that in the tropical glare and heat every white woman had fallen sick and been sent home? Add to this the fact that every house was carefully fenced in, windows and doors, with mosquito-proof wire netting—and mosquito-proof wire netting, when it is not kept clean, and it never is in Africa, keeps out the air so efficaciously that to go into one of these houses is positive pain. Remember, the air can never be changed, and you go in and gasp. I am inclined to think quite as many men suffer from vitiated air in West Africa as from ailments peculiar to the country. The vitiated air that they live in for certainly a good third of their time must lower their vitality, and must give every other tropical disease a chance. A mosquito-net you must have. Let it be a clean cotton net, put it up in some breezy place, sleep under it out in the open air if possible, abstain from doubtful water and too many gin cocktails that are by no means doubtful, be interested in the life, and I feel sure that more than half the battle is won.

Mines, of course, do not make for beauty. I was born and brought up on a goldfield myself, so nobody knows that better than I do, but some of these West African goldfields have the most beautiful setting. Tarkwa is a town set in a great gully among hills clothed in vivid green. The mines burn, I believe, about a hundred trees a day, so that the forest is being rapidly cleared away. I grieve for that, for these paths through the forest are very fascinating. But all the forest must go, for the mines want fuel, and civilisation naturally does not require heavy forest. It is better, so the manager of another great mine, Obuasi, assured me, to clear the land and plant farms, bananas, plaintains, cassada and cocoa, so that ten men may live where not one lived before. He is

right, of course, but presently I am going to put in a plea for the wise saving of some of the grand trees.

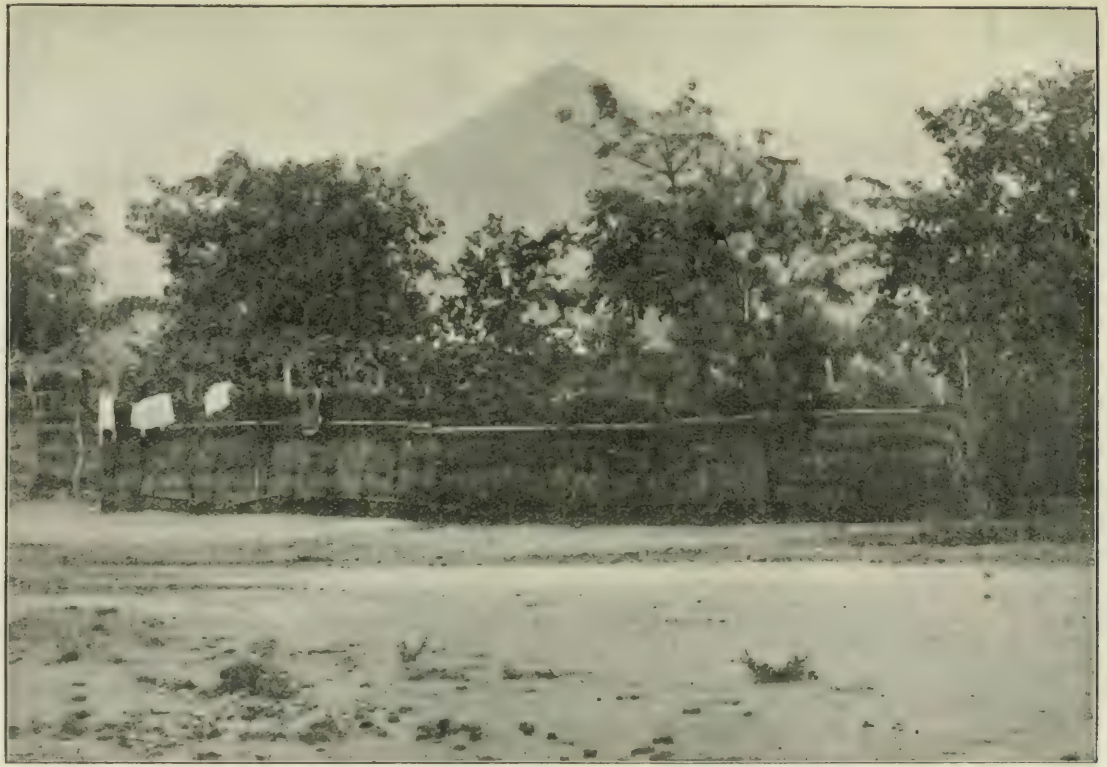
I have heard many opprobrious epithets applied to West Africa, but

A path in the forest.

no one had ever told me, before I went there, that it was a beautiful land, and yet a beautiful land it is, and one of the most beautiful rivers in this beautiful land is the Volta. It is the most lovely river I have ever seen. Not perhaps at Addah at the mouth. For to Addah comes all the trade of the river, palm oil and cocoa and other products. Here

in the old days the Danes had a fort, and here was a great slaving station. But it is a place of swamps, a forbidding place, a place of strong winds too, luckily, for the mosquito here is a wild beast that makes you feel you must go about armed, and if you would live in even partial comfort, the wire netting I abominate is an absolute necessity. Luckily the sea-winds force their way through the meshes and keep the air from becoming vitiated, and my hostess was one of those clever capable women—I am proud to say she was born in my country—of whom there are all too few in West Africa, who made it her business to see to her husband's comfort, and incidentally had her netting carefully cleaned every day. I repeat, if you would live in a mosquito-proof room and keep your health, this is an absolute necessity. Addah was desolate, but it had a charm of its own. The weird swamp warned the traveller that this was the country accursed for the white man, and the gorgeous sunrises and lovely sunsets seemed to say that, if you only look for it, there is something lovely to be found everywhere.

The real interest of the Volta began for me sixty-five miles up, at Amedika, which is really the port of Akuse, a great trading town of the Krobo country. Here come two steamers a week from Addah, bringing mails and taking produce to the sea, but, when I was there, only the ordinary canoe marked it as a port. I was going up the Volta, so I engaged a canoe which was just a little out of the ordinary, in that it had a roof over the centre to shade me from sun and rain. That journey will remain in my mind as one of the most wonderful I have ever taken, for the river was entrancingly lovely, but if any woman is fired with a desire to do as I did and go there by herself I strongly advise her not to go. The half-civilised black men of whom the preventive service is made up are not, I think, safe for a white woman to go among alone. I think it was only surprise at my audacity that saved me; the next woman might not be so fortunate. I was told the other night by the District Commissioner from Akuse that I was warned not to go, so I suppose I was foolish, but I was warned against so many things when I was in West Africa, that I got into the habit of disregarding all warnings. On the whole, it was just as well, for I should have seen nothing had I paid attention to all of them. And even if I was unwise to go up the Volta by myself, it certainly was well worth seeing. No picture that I could take can give you any idea of the loveliness of the colouring. The blue sky was reflected in the water, the shores were a panorama of hills clothed to their peaks in verdure in every shade of glorious green, and every now and again would be a patch made by the thatched roofs of the numberless villages. Occasionally we came to a greater town, and at one of these, Kpong, I spent the first night (see illustration). It is entirely a native town, having about 4000 inhabitants. In the background is a peak, Yogaga, the long woman, which is the great feature of that stretch of the river. The river winds about, and above all the other greenery stands Yogaga, sometimes to one's left, sometimes to one's right, sometimes ahead, sometimes behind, but always vivid green against the vivid blue, as if proclaiming the enormous agricultural wealth of the country.



Kpong on the Volta, with Yogaga in the background.

The Volta is a difficult river to navigate, as I soon found. This is because it is a series of enchanting lovely reaches barred from one another by huge barriers of rock, and I am bound to say many a time when we were negotiating those barriers, and I found the canoe broadside on with the white water foaming all round her, I really thought to myself it looked decidedly as if I and my belongings were going to the bottom. The Senchi Rapids—the worst of these rapids—raise the river thirty-four feet in an incredibly short distance. It looked to me like a wild waste of boiling white water, and how we ever got up it I do not know. That we did was due to the skill of my canoe men.

There was plenty of life along the banks, men fishing in canoes, women selling cassada or maize meal along the banks, and every now and again we came to preventive service stations where I spent the night. There is a curious anomaly in the Gold Coast, two different customs duties being paid along the banks of the great river. On the east bank four per cent., the same as in German Togoland, is paid, and on the west it is ten per cent., the customs duty of the Gold Coast Colony. The temptation therefore is to smuggle from one side to the other, hence these preventive stations.

At Labolabo I left the river, with great reluctance, and turned inland, spending Easter at the British Cotton Growing Experimental Farm with its kind manager. The British Cotton Growing Farm lies, if I judge by my feelings, for I walked there in all the heat of a blazing tropical afternoon, about ten miles from the river, but subsequent investigation has convinced me it is really only about a mile and a half away. It is a picturesque red bungalow, and is set in the embrace of the green hills, looking out over acres of land laid out in cotton, away to where through the hills and greenery you can just see the silver of the river. Odysseus once saw the sea like a silver shield, and so in the blazing sunshine saw I the Volta from the verandah of the bungalow. The Cotton Growing Farm is a failure, for the native having discovered that he can grow cocoa at much less cost and at far greater profit naturally declines to grow cotton, but such a lovely site and such rich soil must be worth a great deal, and some day I hope to see it put to more use. It was there I learned how utterly lonely a man can be, cut off from his kind, and that beautiful surroundings do not save a man from the brooding terror of the African bush. Fear lived there. "There is nothing to fear," said I, full of the change and the delight of new scenes. "No," said my host doubtfully, "there is never anything to fear in Africa till the time when there is something and then it is too late." Oh, it was lonely! I found myself looking down the avenue between the grape-fruit tree and the shaddock at the front entrance and wondering what awful thing might come out of those deserted cotton-fields, and when a tornado on Easter Sunday swept down from the surrounding hills, blotting out everything in a sheet of grey mist, I found that Fear was in the howling wind and in the shuddering rain. Nothing made me realise, as that did, that it was the conditions of life and not the climate that made West Africa a word of ill omen to the white man. Anything more lovely than the surroundings of that

cotton farm I defy any one to find anywhere in the world, yet the man who lived there by himself led perforce a most unwholesome life, a life that by no fault of his own was enough to drive any sane man mad. Up and down the verandah I used to hear him walking, up and down, "the lonely man's walk," said he: "you see those two boards, well, when I can't see them, I know that I 'm drunk and I go to bed." But I don't believe by his looks he ever did get drunk, though it would have been quite excusable if he had, for his life was tragic.

From Labolabo I went up to Anum Mountain, where many years ago the Basel Mission established a station; so long ago, that in 1869 the fierce Ashanti warriors raided it and carried off the missionary and his wife, Mr. Ramseyer, and their child, into a captivity that lasted many years. Some years afterwards the Basel Mission came back to their old site, and as, with true German forethought, they have planted trees and made gardens most carefully, the natural beauties of the place have been enhanced. Here emphatically the German Basel Mission people have made a home, a home in the very best sense of the word, a beautiful garden, a comfortable house, a happy family, and presently I suspect they will bring up children for the mission field, here in the heart of savage Africa. On the other side of the mountain, looking away to the north, is the Government Rest House, looking out over far, far vistas, with the river winding its way across the Afram plain. I only looked at that plain from the top of the mountain, and I wondered what the Government were doing to neglect such an obvious health resort, for here on the top of the mountain, though the sun was hot enough at midday, it was quite cool at night. It was eerie too, for a white mist came up and enveloped everything, so that I could not see beyond the verandah, a white mist by which I knew the moon was shining somewhere beyond, but as I had no carriers about me, and did not even know where my boy had gone, I grew mightily afraid, of what I do not know, —of the stillness and the night, I suppose. Anyhow, I put in a bad time, there in a house that was doubly desolate because the white man had been there once and was there no longer, and the night passed slowly, and I was hungry, because there is a ju-ju over Anum Mountain and there was no possibility of getting food there. "This bush country no good, no can get chop here," announced my boy, and as I had been unprepared for it I dined and breakfasted frugally off tea and biscuits, which was all I had. However, before the mists had cleared away there came a chattering and a shouting, and the carriers who were to take me to Pekki Blengo had arrived.

But at Pekki Blengo I was really in a dilemma. There is a very steep, rugged—and for a woman who is not suited for mountain climbing—difficult range of hills to be crossed here. My helper was a very charming, educated black man named Olympia, one of Messrs. Swanzy's agents, and he explained that over that range I would have to walk. Therefore I decided to do it at earliest dawn. Unluckily I reckoned without my carriers. They came at 5.30, picked up my gear and laid it down again and walked away, saying in the vernacular what my carriers seemed to have said at intervals all along the coast, "We no be fit, Ma.' It was

eleven o'clock before by strenuous efforts I succeeded in replacing them, and then when I had started them all off I found that my hammock boys had gone back to their cocoa farms, and I had not even a drink of water left, for of course I would not have dared to drink the native water, however thirsty I had been. They told me I could hope for no hammock boys till next day, and I felt bad about it because I did not know how I was going to sleep without a bed. Therefore I said I would walk, and proceeded to agitate for two carriers, men or women, to carry my empty hammock. As this would have thrown at least six men out of a good job, about one o'clock eight hammock boys appeared on the scene, deciding to accept four shillings each for the journey to Ho in German territory, and we started.

In a very short time we reached the Eveto Range and the trouble began. I had had nothing to eat or drink since five o'clock in the morning, the day was blazing, and the way—no words of mine can adequately describe that way. It was steep and it was rugged, and it was full of holes and roots and rocks, and I climbed and sat down, and climbed and lay down, and climbed and thought I would die, and did not care if I did, and wondered what joy people found in Alpine climbing, and when life seemed to have resolved itself into an eternity of effort to which there was no end I found I was at the top, looking out over a wilderness of verdure-clad hills, range upon range, dappled with shadow and evening sunlight, such a view as would be glorious in any land. My thoughts were confused; joy at my attainment and the unexpected beauty of the view, for very seldom does any one tell you you may expect beauty in West Africa, and horror at the thought of what a slave-driver I had become, for those wretched carriers were going over exactly the same ground as I had covered with so much difficulty, and all those luckless men and women had loads upon their heads which they agreed to carry to Tsito, at the foot of the range, for sums varying from sixpence to ninepence a head. I felt as I started down the Eveto Range that Legree could not hold a candle to me, and when, after a struggle nearly as difficult as going up, we arrived at Tsito and I was shown to my sleeping quarters, Swanzy's cocoa store, I called them in and, very unwisely to ease my conscience, paid them double.

I put it on record that that struggle did not do me any harm whatever. I had an evening meal of eggs and tea and biscuit. I looked at the small drop of gin I had left, and decided to keep it for greater emergencies, and the population at Tsito stood round the store and discussed my personal appearance aloud. At least I suppose they did, for they looked and talked a great deal, though I could not tell what they said, then presently I put out the lamp, had my bath in the dark, and went peaceably to bed, and as I dropped asleep I could hear the audience dispersing, still discussing the show at the top of their voices. I had no means of knowing whether they found it satisfactory, but anyhow it was cheap. The next morning was glorious, and I felt as if the world belonged to me. I started off my carriers for German territory, and went round taking photographs.

Swanzy's Store at Tsito was only a humble place, ruled over by

a black man who bought cocoa and cotton from the farmers, and retailed them kerosene, the commoner sort of tinned fish, cotton cloths, and a little gin, but it is interesting as showing how trade and the desire for something beyond the mere necessaries of life is spreading into the remoter corners of these West African colonies.

I had some difficulty in getting away owing to my foolishness in paying my carriers extra the night before. When I turned to my hammock my boys were not forthcoming, and the head of the store, who was the only person about who could communicate with me, announced with negro pomposity, "There is trouble. They say they no can carry you; Ho be far, and you not give enough money." I was furious, for most of the day before they had only carried themselves and the empty hammock, and I had given them two bottles of rum. If I had thought about it I would have found the situation desperate, for I was entirely at their mercy, had not even my servant with me; he had gone with my carriers, and I did not know the road to Ho. Luckily I was too angry to think about that. I simply marched back to the store and said, "Tell them they can go home, and I will pay them nothing at all." What I proposed to do, if they had taken me at my word, I am sure I do not know, but evidently my position did not strike them as so helpless as subsequent reflection convinced me it might have been, for they came back promptly to work, and carried my hammock through orchard bush country where the road was so bad that most of the time I had to walk; and the butterflies, blue and purple and orange and white, were so gorgeous that the remembrance of them is with me still. I was troubled a little because I could not believe that this was really the main road to Ho, and I wondered if it was possible that these men were taking me out into the bush; and when we walked, much to their amusement, I made them all walk in front of me. I need not have worried: they were simple, honest peasant farmers, and I was worth a deal more to them safely at my destination than any other way, for after what seemed to me a very long and tiring march I arrived suddenly at the border. It is a purely imaginary line, orchard bush country on one side, orchard bush on the other, and the only difference is that on the British colony the road is barely marked from the surrounding bush, while in German Togo the road is broad and rolled, and well kept as a garden path. The carriers heaved a sigh of relief when they found themselves upon it, and we fairly raced to the first German village. It was my first introduction to German thoroughness, and I was amazed at the neatness and tidiness of the little town. It was swept and garnished, there were no ruts and holes, no waste water to breed mosquitoes, no garbage or litter lying about, and above all there were the most beautiful shade trees with wooden seats ranged under them, so that the villagers might take their noonday rest there comfortably. I don't know whether the native is happier under German rule, but I am quite certain he is cleaner and healthier. I met no mosquitoes in Togo, and since I was astonished and delighted at the way the authorities had conserved and planted trees, I cannot think that the trees are responsible for the mosquito, as I have so often been told. The natives prefer British rule, partly, I think,

because the Briton has intuitively a better way with the native than the German, and partly because it gives him freedom to live exactly as he likes; it does not insist on such drastic cleanliness, and the mosquito has evidently plumped for British rule because the Briton, whether from a sense of fairness or not, certainly gives it a better chance of life.

I have been accused of unduly praising the Germans. But I have only spoken of what I have seen, and you would not surely care to come and listen to me if I bore false witness. It may be, of course, that a tremendous lot of money has been spent in Togo, that I do not know. I only know that last year it paid, and that if foundations well and truly laid mean anything, it will go on paying. To begin with, the Germans have learned what we so sadly need to learn, the value of continuous service. The German Commissioner's bungalow at Ho is on top of a range exactly like the appalling Eveto Range, but the road is gently graded, and is as easy of ascent as a path in Hyde Park. The Commissioner has been there for the last six years, and the place is laid out as a beautiful garden, all the natural beauties having been preserved. Behind the house is a magnificent plantation of teak-trees, and from the verandahs and garden paths is a view that takes in miles of lovely tropical country, with, in the far distance, the highest mountain in Togo.

The Commissioner had his wife with him, a smiling, rosy-cheeked girl who had been out fourteen months, and was the picture of happy contentment. Would you have had me ignore this prosperity and contentment? Is it not rather wisdom to seek out its reason? I say emphatically the nation that can take its women with it is going to hold a country far more firmly, and far more satisfactorily, than that one that leaves its women at home. And in this matter the English fall far behind the French and Germans. Sometimes this is the fault of the women. I have seen in West Africa women so dependent on civilisation, the intense civilisation of a British town, for their comfort, so absolutely without resources in themselves, that they were just a burden and a care to the unlucky man they married. They became ill, and blamed the country and the climate when they should rather have blamed their own helplessness and stupidity, and I am more convinced than ever that if Government or private firms would see to the proper housing of the women, and instead of either forbidding them to come, and penalising them if they do come, as they so often do, offered a bonus to every woman who stayed out her full term without being very sick, they would find a very great difference in the health and prosperity of the colonies.

If Britain is going to keep her pride of place in the Tropics, she must encourage the women to go out with their husbands. There are men who say they would not expose their wives to risks, and that is kindly, but unwise; there are quite as many risks in staying behind as in going with their husbands, and those other risks that come from divided homes and divided interests ought to be considered, for they are far more insidious and dangerous to a nation's welfare than the African climate. Of course where there is open warfare a woman

would be in the way, but there are very few places now on the coast where there is any danger of that sort, and anywhere else a woman should be a comfort and a help to her husband. Some are, I know. If you have read Major Tremearne's book you will find what he says about the helpful resident's wife who gave cooking lessons to her bachelor friend's servants in Nigeria, and if you have read Captain Haywood's book you will see what he says about the French women in Senegal, where a man apparently takes not only his wife, but his daughters. I know, of course, there is in some quarters strong opposition to women going. I remember hearing one man say openly that when white women made their appearance life was spoilt, it was not so free. That made me more sure than ever that what West Africa wanted was good sensible wives to raise the tone and the health of the country. There is another thing to be remembered. The native finds it hard to bring himself to respect a man who has no wife, therefore to the man who brings out his wife, he at least will give full measure of honour. These things must be known to the authorities, and yet I am told that in Northern Nigeria, while a man may live in Government quarters rent free, the moment he brings out his wife he is charged £30 a year for his quarters, though he have the very same he occupied as a bachelor. I could hardly have believed this, did I not know there were most curious anomalies in the treatment of women on the coast. No one will deny that the nursing sisters at the hospitals must have made an enormous difference to the man going to the coast. Yet this is what happens to them. The hospitals are Government property, the medical officers are Government servants, but any officer who has a private patient too ill to remain in his own quarters, transfers him to the hospital, where he very properly pays a certain sum for his keep and attendance, which sum is divided between the medical officer and the hospital. The nurse, also a Government servant, nurses these private patients, but it has never occurred to any one that she has a right to one penny for extra work that may, perhaps, keep her up day and night for days on end. Who cares what happens to a nursing sister?

The farther I went, the more I was convinced of these two things, the necessity for bringing out white women, and the fact that in Togo at least the Germans were making a very good show. Understand, I only speak of what I saw, and I saw that the Germans were certainly running their colony with thoroughness.

The first town I stopped at after leaving Ho was Palime. In the market the women were cooking and selling maize-meal balls, fried a nice crisp brown in palm oil, and making and selling cassada porridge. Cassada is the root from which our tapioca comes, and this thin porridge forms the black man's first meal, at any rate in these parts, early in the morning. It is warm and wet, I suppose, but it looks uninterestingly like paste. Palime is railhead; and when I arrived there late one night I knew my bush journeying was done for a little. It is one of the cleanest towns I have ever seen, and I slept undisturbed, without mosquito curtains, a testimony to the thoroughness of the

Germans. The roads in Togo are excellent, and there are six hundred miles of them. When the German Commissioner told me that, I murmured "Forced labour," but he indignantly denied it. "There is a tax," said he, "of six shillings a year, and if the man does not pay, he must give a fortnight's labour. It is only fair, for if we have no roads we have no trade." And I, thinking of the twenty-five per cent. of the cocoa harvest left up the Afram creek, "because we no be fit to tote," had perforce to agree with him. Why should not the man to whom the roads are of paramount importance contribute to their upkeep? The country round Palime is like the country on the west of the border, with this difference, the excellent roads. Unless there were good roads, the carts heavily laden with merchandise could not get about the country, drawn as they are by Kroo boys. They pull these heavily laden carts through the most beautiful country, along hillsides, where the ground falls away from the roadway, and drops down hundreds of feet into the valley below, and away, far away, in the blue distance on the other side of the valley, rises another picturesque hill.

Misahohe, nestling on the hillside amidst luxuriant tropical greenery, but for the palms and the strong sunshine might have been a village on a Swiss hillside, and I went up away beyond, because I was bound for Mount Klutow and the sleeping-sickness camp the Germans have established there. It has to be on a mountain top away from all vegetation, because vegetation harbours *Glossina palpalis*, the fly that, when infected, is the cause of the evil. I went up there one hot Sunday in May 1911, and Dr. Van Raven, the German doctor in charge, received me so kindly and told me so much about it, though I was an outsider and a foreigner, that I almost felt myself competent to grapple with sleeping-sickness in all its forms. It is curable, he believes, though it is as ghastly as consumption, and often quite as hopeless. There was a time when the natives feared and dreaded the Germans, and could only be got to the sleeping-sickness camp by main force, but that time has passed away, and they now come eagerly from far distances; the sad part is that they so often come too late.

From Palime I came down by rail to Lome. Lome is one of the most charmingly laid out towns on the coast. The bungalows provided for the officials are like palaces, the gardens are things of beauty, and all the streets are nicely planted with avenues of trees, some tiny, just planted, and some four years old, which stretch their branches right across the street.

From Lome I made my way along the coast to Keta, passing across a narrow strip of sand that runs for many miles between a lagoon to the north-west and the ocean to the south-east. It is a very narrow strip of sand, and it is very hot, but thereon are many cocoa-nut palms from which it is expected in the future to make much copra. The villages, in contrast to the German ones, struck me as peculiarly filthy, and the reek of them was overpowering. It was as if all the natives who had desired the freedom and resulting dirt of the lax British rule had come across the border and settled on this strip of sand, just out of

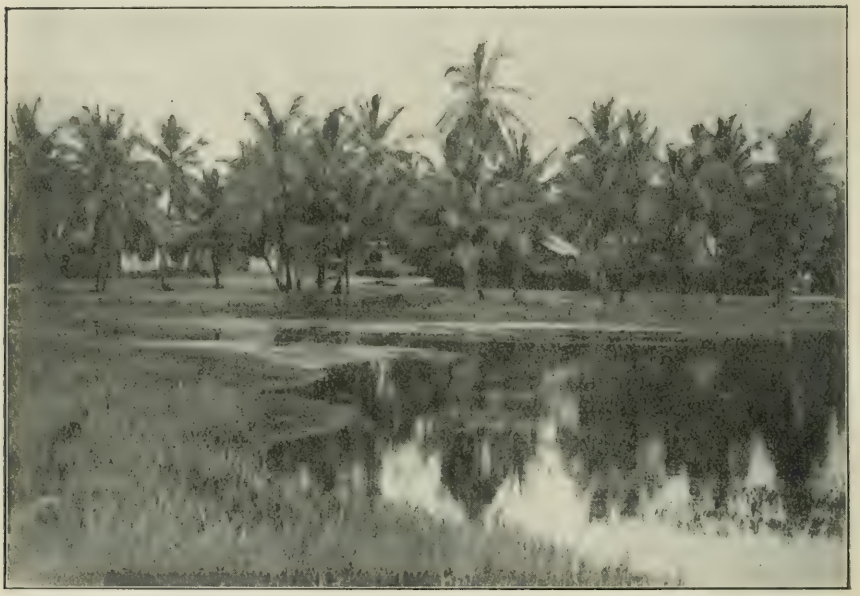
reach of the German scrubbing-brush and pail. I am only stating facts, those villages are filthy. It is for you to say whether the German methods are better. They are certainly more thorough. In Keta, where I arrived after a long day's tramp, I should say the people are decidedly happy and entirely contented. The sandbank here is possibly a quarter of a mile wide, and there is a great native town that carries on a big trade in poultry, chickens, turkeys and ducks, palm-oil from across the lagoon, and does much weaving. The negro woman is a born trader; from her cradle to her grave it seems to me she is buying and selling; and here in Keta, because I stayed with the Bremen sisters who spoke the vernacular, I got more closely in touch with the people, especially the women, and was deeply interested. There were dozens of little traders all down the streets, beginning with the woman who at earliest dawn stationed herself at the corner outside the fort with her little fire and her little pot to sell porridge to the early breakfasters, and ending up with the women who sat in the streets in the evening with big platters of native-made sweets at their feet. The regular market where the authorised buying and selling was done was held on a flat, featureless piece of ground alongside the lagoon, and one had to seek for beauty in the quaint folk and the varied assortment of goods laid out on the ground or on the stalls for sale.

These markets in the native towns, save for the heat and the dress and colouring of the people, are to all intents and purposes exactly like the markets we see held in country towns and in the poorer streets of the great cities of Britain. Human nature has points of resemblance all the world over. Certainly in England the daughters of the nobles do not sell beer for profit like the daughters of the chief here, but it is laid upon all the women of Keta to be self-supporting, and I think they are all the better for it. The lagoon is close to the market-place, and here the canoes take the goods that arrive from the sea to the interior and bring back the produce, palm-oil and cocoa I think mostly, that must be shipped to Europe. The houses of the people are comfortable enough in their way, for these are not savages, they are simply a peasant people. The sister took me to pay a round of calls upon the chief's wives. There were, I think, sixty of them. They were most hospitable, and many of them gave my hostess small sums of money varying from sixpence to half a crown, so that she might buy something to make a little feast for me.

In a courtyard of the house of one of the wives of the chief, a prosperous, contented woman, with children of her own, we saw two or three girls she had taken in to instruct in the art of bead rubbing and other necessary feminine accomplishments, just as in the old days in England the wives of the powerful nobles were surrounded by the daughters of the smaller gentry. I must confess I do not understand how in a community where apparently men and women are about equally divided, a man can take to himself sixty wives without seriously upsetting the balance of society. Here in Keta this powerful chief has most certainly sixty women who are nominally at all events his wives, and who live, some in houses in small compounds attached to his house, some scattered over the town, and some

away in the country. I visited another household of smaller dimensions, the man having only four wives. He was a clerk attached to the Bremen Mission Factory, had once been a communicant and pillar of the church, and still wore a stiff collar, a straw hat, and tailor-made clothes, but the rules of the church had been too much for him, he could not deny himself the dignity which attaches to a man with many wives.

Weaving is a great industry at Keta. Why weaving should have gone ahead on this little strip of sand, which looks to me as if the first great storm would overwhelm it, I do not know, nor do I know who first taught the weavers, but Keta clothes are in demand all over the coast, and rightly so, for they are well woven and the colours skilfully blended. It



Lagoon at Christiansborg.

is only when the negro comes into contact with European wares and tries to ape them that he loses his sense of proportion. The thing that is entirely native is by no means ugly even if it may be quaint.

All along the shore about Accra and Christiansborg you come across ruins which are reminders of the old strenuous days when men built not only for a living place, but for defence. Some day I should like to tell you of the mighty castles now falling into decay, put up by the Danes when they landed and held these coasts in the wars when nations took little count of them. All the tribes seem to have been warlike fighting men in past days, and this is a matter we might well take to heart when thinking of West Africa. Long has it been known as the White Man's Grave, but this same place that for years has been stigmatised as having the most deadly climate in the world, produced a race of men and women so strong, so virile, so adaptable, and I suppose we must add so stupid,

that the civilised world for at least three centuries came regularly here for its labour. This heat and damp produced mighty thews and sinews, and, so long as the native does not imitate too closely European modes of life, it produces them still. Both men and women carry heavy weights on their heads. The men are fine to look at, though you may not admire the negro type of feature. The young women, before hard work has worn them out, are things of beauty, like bronze statues, and walk and carry themselves like queens. No effete race is this, dying out before the arrival of the white man, but one strong and virile, and the country that produces it cannot deserve all the epithets that have been hurled at it. We know that the health of the coast is improving every day, and I look forward to the day when we shall find out the reason why the land of the stalwart negro makes the white man anæmic. Maybe the remedy will be as simply and as easily applied as the knowledge that fresh air kills tubercle. Of course nine months of the coast did not make me anæmic. I never had better health in my life; so possibly I am a little prejudiced in its favour.

The great race of the West Coast, which has terrorised over the rest for centuries, is that of the Ashantis, and, as I longed to see the forest country, I went by train to Kumasi and there prepared for a journey through the forest to Sunyani, a station on the outskirts of the colony, five days' march to the north. Ashanti, as you all know, is conquered country, and twelve years ago was at grips with Britain. But it is most effectually conquered now, and in the places that ran with the blood of human sacrifices are now going up large handsome buildings, the stores of the great African merchants. It is a charming place, Kumasi; I have but one fault to find with it; in a place where plenty of fresh air is the great desideratum, an absolute necessity, the African merchant princes are putting up their houses as close together almost as if they were in Liverpool itself, and very often they make their clerks live in cubicles that are little more than death-traps. The town is well laid out and beautifully planted with trees, but what interested me most were the big African chiefs who, with umbrellas twirling (the umbrella is the sign of rank) marched about the streets. I am thankful to say that the good taste of the people forbids the chief to appear in anything but native dress.

In Kumasi the transport men kindly provided me with carriers, and I started north through the great rubber forest. The forest remains in my mind as the most wonderful and awe-inspiring of my experiences. It was difficult to take photographs, for the trees day after day stood in close phalanxes, straight as Nelson's column, never breaking into branches till they were possibly 150 feet from the ground, and between the trunks was a dense undergrowth of fern and creeper, and jungle of all sorts, so closely twined that it was impossible to step a foot from the path, which must have been kept open by an infinity of pains. Never in the world have I seen such mighty trees.

The Ashanti houses are simply four verandahs built round a court-yard open to the sky, extremely healthy, I should think, and I for one am sorry to think they are passing away in favour of European houses

entirely unsuited to the climate. What can be pleasanter on a hot tropical night than to sleep with the open air all round you? I confess that when first I arrived at the rest house I was a little dismayed to find it full of Hausa and Wangard traders, and I wondered where I was going to get the necessary privacy. But the lady who owned the house—she was simply clad in a scanty blue cloth and had her head shaven—cleared out the traders promptly, and having had a little tent made of my rugs for my bath, I found the rest simply delightful, and I slept. I slept like the dead and awoke refreshed, feeling as if the world was mine. People say to me, "Oh yes, it was all very well for you, you were interested," and, as I said before, in that I suspect lies the crux of the matter. I wish I could give you a detailed account of that forest journey, show you the green of it, so pale that it was gold, so dark that it was black, let you smell the rich sensuous scent of the orchids, see overhead the narrow strip of hard blue sky so far away that only for a short time at midday did the sun reach the doorway.

Potsikrom, my next stopping-place, is built in European fashion, and the consequence is that the two little rooms are unbearably hot and stuffy. The only thing was to have my bed placed right in the doorway, and this had its drawbacks. In an enclosed courtyard you feel safe if you are alone, but these rest houses are generally the last houses in the village, right on the outskirts, and when every living being had retired to the safety of the village and left me all alone, in the doorway of a house on the edge of the forest, with only a mosquito curtain between me and possible danger, it was generally rather terrifying. There was nothing to be afraid of but the trees, but African trees have a personality of their own, and I have put in some few nights wondering what they would do to me if they could catch me. I assure you I listened more than I liked in Potsikrom to the sounds of the night. Those fears were no light thing, but the journey was well worth it.

The farther north we went the denser the forest became till, north of the Tano river, we had left even the road behind and travelled in a pathway that wound beneath the great trees, travelled mostly in gloom, for neither sun nor rain could penetrate, and yet I assure you it had a wonderful charm. I do so hope and pray the British will not rashly cut down and destroy that forest. A mahogany-tree is just as well worth preserving as an oak, and though it takes two hundred and fifty years to its full growth it is often rudely cut down and destroyed in a single day. Opinion on the coast seems to be against that wonderful forest, that cathedral not builded with hands, and I shall not soon forget the delight of the medical officer who was with me when we came to a place where perhaps for two hundred yards back the trees had been ruthlessly felled, not one being left standing, though the climate cries out for shade, and the young man himself wore a very large helmet and a spinal pad, as he explained, to protect him from the sun. Roads must be made of course, and the forests must be cleared, but to you Geographical Societies who have any influence I appeal for some discretion in the clearing. Do not let Britain make a sun-scorched wilderness of Ashanti and think she has done her duty. I know there is a forestry

department in the Gold Coast now, and some of the members are very keen on their job, so I am hoping great things for the future, but I would have every man who goes into the forest remember that a tree,

Entrance to an Ashanti village.

specially these African trees, mahogany and kaku and other great hard-wood trees that take hundreds of years to their growth, cannot be replaced in our time or our children's time, or our children's children's time. The faith that nothing matters in an outland will not do for Britain now that other nations are in the colonising world, eager to make their colonies things of profit and beauty.

And so through the forest I came at last to Sunyani, where six white men hold and rule the place for Britain. The official bungalows are built of mud without doors and windows and with steep pitched thatched roofs and mud floors, and because they are very spacious and wide, with openings where those same doors and windows should be, seem to me ideal places of residence for the climate. They are built, of course, away from the town, and, close at hand, a sort of reminder of the brooding fear of West Africa, is the little fort where the occupants could retire should there be necessity—the provincial commissioner says there will never be necessity again. The stakes round the wall are bound together with a tangle of barbed wire. It is all very simple but very suggestive. The sentry-box is at the only entrance, and there is a company of black

Ashanti warriors.

soldiers drawn from a distant part of the colony on guard. Half of the white population is composed of their officers. But those who know are emphatic that this is a phase that is passing away. The negro is a keen trader. He would rather make money than fight any day, there are stores growing up in the town, and the post-office just in the shelter of the fort is beginning to pay.

From Sunyani I went on five miles further to Odumase, where the last Ashanti war first broke out. As a punishment for that war it was almost destroyed, and though it is rapidly being rebuilt there is really not much to see there, but to me that journey was full of interest. I was the first white woman who had ever been there, as I was the first white woman along all the track north of Kumasi. The chiefs, in all the glory of umbrellas, silken robes of many colours, and numerous attendants, turned out to meet me, and everywhere in the streets crowds

came to look on, but the arrival was the most exciting of all. To be fired at out of long Dane guns by warriors with their cloths girt about their waists and their powder-flasks slung under their arms, is the greatest honour an Ashanti can confer upon you, and the Ashanti warriors of Odumase conferred that great honour upon the first white woman to visit them. Luckily I had been warned, for I assure you it is quite a nervous thing to be carried along a forest path and suddenly from the greenery to find half a score of armed warriors dashing out at you and guns going off over your hammock, under it, before you, and all round about you, to smell the acrid smell of the smoke, listen to the barbaric yells, and then to see half-clad dark figures fleeing along so that at the next turning the fusillade may begin again.

Now, have I, I wonder, carried out my promise and given you a new view of West Africa? It is tropical, of course, but I do honestly believe it is no more difficult to live in than any other tropical climate. Improve the conditions and you will find that the climate will improve. Once more I say it, and I say it emphatically, if you want to improve this land which should be one of the richest jewels in the British crown, you must improve the conditions, you must encourage every man to take out his wife. Already there is a beginning and things move slowly. Already ten women go out where one went before, and even though some come home saying the land is hateful, some have a higher conception of their duty and stay and do their best to make it more comfortable for their husbands and those around them. Every one who stays makes it easier for the next woman, and the more white people, with their higher standards of comfort, in a place, the better and more habitable that place is bound to become. I assure you West Africa, the land of opportunities, one of the richest lands in the world, is well worth a most mighty effort.

A GEOGRAPHICAL DESCRIPTION OF FIFE, KINROSS AND CLACKMANNAN.

By Laurance J. Saunders.

(*With Sketch-Map.*)

(*Continued from* p. 87.)

III.—Modern Fife.

Origin of Modern Fife.—Mediæval Fife was a beggar's mantle fringed with gold; the interior, save Stratheden, being unimportant and thinly peopled, the coasts, especially those of the Firth of Forth, strung with numerous royal burghs betokening considerable wealth and commerce. The presence of these burghs surely implies a certain degree of centralisa-

tion, and geographical influences had carried this centralisation a little further, inasmuch as the burghs were grouped along two particular stretches of coast. But the number of burghs also implies isolation within these limits. Each little port had its own fairs, its own ships, its own salt-pans; and after the Reformation had robbed St. Andrews and Dunfermline of their ecclesiastical importance, no one burgh was predominantly more wealthy or more populous than its neighbours. Indeed the commercial and industrial conditions were such that, along the favoured coasts, geographical isolation did not destroy commerce or industry. Each little creek had a burgh at its head, and each burgh had the same advantages as its neighbours. Perhaps the beginning of a different order of things may be surmised when the little ports of the upper firth began to use sea-coal in their salt manufactories, but whatever new distribution of population and wealth this factor could have made in the seventeenth century, was postponed by the great decline of the Restoration and Revolution periods.

Effects of the Industrial Revolution.—But after the Union of 1707 the markets of America and England were thrown open to Scottish enterprise, and there commenced a new industrial development which led up to the Industrial Revolution and the modern factory system. Contemporary with this was a continuous, and in the eighteenth century a very rapid, improvement in agriculture, and then, last of all, new methods of conveyance by land and sea. As the result of these advances the relative positions of the East and West Coasts of Scotland were somewhat altered. Round the western end of the Rift Valley, that is, in Clydesdale and Ayrshire, now gathered dense populations, attracted at first by the convenience of the situation for the new American trade, and then finding surer prosperity in the adjacent mineral wealth which now became almost an essential to industrial greatness. But though the East of Scotland was shut out from predominance in this western trade, its initial advantages of a good climate and accessibility from the Continent secured it from decay. It had its own coalfields and its own peculiar industries, and while it nowhere presented such an intense concentration of population as around Glasgow, its larger area suitable for development enabled it to support several important centres, such as Edinburgh, Dundee, Perth and Aberdeen. Thus immediately outside Fife the great centres remained almost the same, for the Industrial Revolution acted only in what was already the most populous part of Scotland, the Rift Valley, and with the exception of the rise of Glasgow (which was important even in mediæval Scotland), there was no great shifting of population as in England. Thus on the borders of the peninsula, Edinburgh, Stirling, Perth, and Dundee, places which had determined the routes to and from Fife in the Middle Ages, still retained their importance.

In the peninsula itself, however, there was considerable change. The east had long been supreme in wealth and population; but now, while the east did not languish, the determining factor of convenient supplies of coal drew industry and commerce to the west where are now the great centres of population like Kirkcaldy, Dunfermline, and Cowden-

beath. Moreover, when the commerce of the peninsula, like that of the rest of Scotland, with the increasing size of vessels employed, centred more and more at one or two points where the volume of trade encouraged the construction of large harbours, the small creeks of the east were deserted, and in the west arose ports like Charlestown and Methil whose greatness the Middle Ages had not known. Lastly, with the increasing use of railways, the long firths penetrating on either side of the peninsula to Stirling and Perth proved barriers to direct communication. Between Glasgow and Perth, Dundee, and Aberdeen, the old route by Stirling and Strathallan, up which the English invasions had gone, was still the most convenient; but between Edinburgh and the now populous North-East of England and the northern centres, long detours round the head of the firths or else inconvenient railway ferries proved both expensive and annoying. The difficulty of a more direct communication between the south-east and the north-east was solved by the construction of the Forth Bridge (1890), across the firth at the natural stepping-place of Ferryhill, and the Tay Bridge (1877 and 1887) constructed opposite Dundee. When it thus became a link in a great trunk railway system, the peninsula ceased to be so completely isolated as previously. These changes and advances prepare one for some corresponding change in the internal place relations.

For a more detailed description, the peninsula can now be divided into three areas, distinct to some extent by physical feature but more by diversity of industry—(1) the county of Clackmannan: (2) the west of Fife and in addition the small county of Kinross, that is, the whole Leven basin and the highlands to the south of Loch Leven as far west as the old Forest of Clackmannan: (3) the east of Fife, comprising the peninsula east of Glenfarg, the Lomonds, and a line following the height of land between the Lomonds and the hills of the East Neuk to strike the coast at Leven.

1. *Clackmannan: Industries and Communications.*—The boundaries of this county, the smallest in Britain, have already been described as formed by natural features—the Ochils, the Forth, and to the east, the Forest. In the west where there is no well-marked feature *large* enough to form a boundary between the Devon and the Allan, the line from Blairdennon Hill to the Forth follows the convenient course of small hill burns to the latter stream. Of this small area of 35,000 acres, the northern half is occupied by the Ochil Hills; the southern half by fertile flat carse-lands across which a low clay ridge runs westwards to divide the Devon and the Forth; underneath this lower plain is the small bed of true coal measures preserved by the fault from Dollar to Menstrie. All this diversity of surface and its various riches lie within easy distance of the Forth. Hence each new industrial development found Clackmannanshire able to profit by it. The Ochils were suitable for pasture, the carse-lands for cultivation. The agricultural progress after the Union improved the sheep, and new methods of draining and manuring made the lower lands particularly suitable for cereals and beans. From the produce of the hill area arose

a manufacture of woollens ; from the produce of the carse-lands, distilling and brewing. And in pre-railway days, when transport was dear and, unless under exceptional circumstances, an industry could not flourish away from such cheap means of communication as a navigable river or the sea afforded, the close proximity of the Forth and the convenience of the port of Alloa enabled these industries of Clackmannanshire to advance beyond the supplying of only local needs. Nor did the first stage of the Industrial Revolution cause any change, for since the new machines were driven by water power, what was more convenient than the power supplied by the numerous mountain burns which plunge down the southern face of the Ochils to the Devon? And so a string of small towns arose along the base of the hills, in some instances, as at Glenochil (Menstrie[1]), employed in distilling but more often manufacturing woollens, as at Alva,[2] Tillicoultry,[3] and Dollar,[4] and exporting the finished product through the port of Alloa, around which grew up the most considerable town[5] of all, naturally situated as a centre of converging routes, and combining both the distilling and the woollen industries. Nor did the application of steam power disturb those industries, for part of the plain was underlain by coal measures, and there was little distance between the mines and the consuming industries. When railways were built they brought about no shifting of the population. It was hopeless to attempt any railway construction across the Ochils, for not even a carriage road crosses this range between Strathallan and Glendevon. But there was little workable mineral wealth in the hills to make this disadvantage felt, and so the railways of the shire are confined to the carse-lands where construction was relatively easy, and the population dense. Alloa is the centre ; westwards a line runs to Stirling, one of the great junctions of central Scotland, with a branch from Cambus, a brewing village at the mouth of the Devon, across the Carse to the Hillfoots, where it taps the distilling and woollen centres of Menstrie and Alva. From the south a line enters Alloa from Larbert, crossing the Forth by a long narrow bridge, which thus avoids an inconvenient detour by Stirling and gives Alloa direct communication with Glasgow. This line from Glasgow is continued to Perth across the clay ridge behind Alloa to such centres as Tillicoultry and Dollar and up the Devon valley to Kinross. Another line cuts due eastwards through the thinly peopled Forest to Dunfermline and Edinburgh, while yet another diverges at the town of Clackmannan, now displaced by Alloa as the county town, to the coast of the firth at Kincardine. With such a variety of industry carried on by a population confined to a narrow plain some three miles broad, it is little to be wondered at that this little county of Clackmannan should form one of the most populous areas of Scotland.

2. *Western Fife :* (a) *Historical Progress.*—The second area into which the peninsula has been divided is also of great importance. It comprises the plateau lying around Loch Leven, the lower plain of the Leven,

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[1] Pop. (1911) 918. [2] Pop. 4332. [3] Pop. 3105.
[4] Pop. 1497. [5] Pop. (1901) 11,417, (1911) 11,893.

and the alternate valley-and-hill region between these lowlands and the Devon. This area was neglected during the Middle Ages. Except along the coastal strip where were situate the abbeys and the royal burghs, it was mostly covered with cold and retentive clays, and was in addition high and exposed. Yet this area is now the most important in the whole peninsula. It contains four of the five towns which have a population of over ten thousand souls. Such a population as seems here foreshadowed could not have been attracted by agriculture alone, for although the agrarian improvements following the Union did something to break in the clays, the soil was not such as could be turned into really superior land, and with, in addition, large tracts unfit for anything but rough pasture, the area never was, and is not yet, conspicuous for its agriculture. In Kinross, the most favoured part, where farming is still the predominant industry on the morainic gravels, the largest town [1] has a population of under three thousand.

There was certainly considerable industrial progress subsequent to the Union, when the English and Colonial markets were opened, and the opportunity was taken to revive the linen manufacture, which had before been extensively carried on as a domestic industry, using local supplies of flax to satisfy local needs. At first very widely distributed over Scotland, the industry gradually centred in the east, which was most conveniently situated for the importation of foreign flax (particularly from Russia), and so, while the bulk of the industry settled in Angus, several very important branches flourished in Fife, both east and west. Its progress in the east is discussed later ; in the west as a domestic industry two influences determined its location : the cost of transport and the advantages resulting from proximity to a good bleaching and dyeing water. Hence it was pursued along or near the coast at Kinghorn, Kirkcaldy and Dunfermline, the prosperity of the last being secured by the introduction [2] of the manufacture of damask cloth, learned surreptitiously at Drumsheugh, and by the establishment of the British Linen Company (1746). In the interior, the water of the Ore, coming from mosses and mixing with coal water, was unsuitable for bleaching and dyeing, but the peculiar excellence of the water of the Leven and its northern tributaries overcame the disadvantages of an interior situation, so that such villages as Markinch, Kennoway, Leslie, and Kinross, all in the Leven basin, became thriving weaving centres, importing their raw material through the rising harbour of Leven at the mouth of the river. Nor was there any further movement of the industry when the later stages of the Industrial Revolution brought in the extensive use of coal and machinery.

The true coal measures of this area have already been described as lying between Leslie and Pathhead, and passing under the Firth of Forth to the smaller Midlothian field. But the rest of the area (except the plain of Kinross, which, composed of underlying Old Red Sandstone, has no chance of bearing coal measures) is occupied by the carboniferous limestone, in the middle series of which are to be found extensive coal developments. This coal area lies, roughly, between Benarty and

[1] Kinross, pop. (1911) 2618.

[2] 1718.

Burntisland, and runs from the newer measures of Strathleven on the east, south-westwards to the shores of the upper firth, near Torryburn and Culross. But, as in the carboniferous limestone of the East Neuk, where volcanic intrusion has either so destroyed or so broken up the measures there present as to render their working almost profitless, such volcanic areas as the Burntisland hills are by no means productive. The richer coal-bearing area of the interior is thus restricted to the wider, shallow valleys of the Ore and the Lyne, where volcanic action is least in evidence. At first development was confined to the stretches of coast where the measures are naturally exposed, at Wemyss and Torry, where, it will be remembered, the salters of Stuart times had begun to use sea-coal. After the Union, under the same transport conditions, there was little advance inland, but even this development, restricted as it was to the coast, secured the prosperity of the industries settled there when the application of steam power became general. The coarser linen manufactures of Kirkcaldy lay only two miles away from the pits at Dysart, the southern apex of the Wemyss field; the northern limit of the field touched Markinch and Leven, and was within convenient distance of Leslie. Kinghorn, further away to the south-west, did not derive such conspicuous benefits in these pre-railway days of expensive transport, but Dunfermline lay near the coastal field of the upper firth, of which the growing prosperity may be indicated by the construction, in 1761, just one year after the Carron Ironworks on the opposite side of the firth had created a brisk demand for coal, of the port of Charlestown, which served as an outlet for the products, mineral and textile, of Dunfermline and the Earl of Elgin's estate of Broomhall. Development of the interior was hindered by the transport problem, which could not be solved by canals owing to the nature of the surface. It was later solved by railways, which, running from the coast through the parallel valleys, opened up such a rich field in the valleys of the Ore and Lyne that towns like Cowdenbeath and Lochgelly sprang up with American rapidity. Lastly, the construction of the Forth Bridge made this western portion of Fife a link in the great trunk routes from the south to Perth and Dundee.

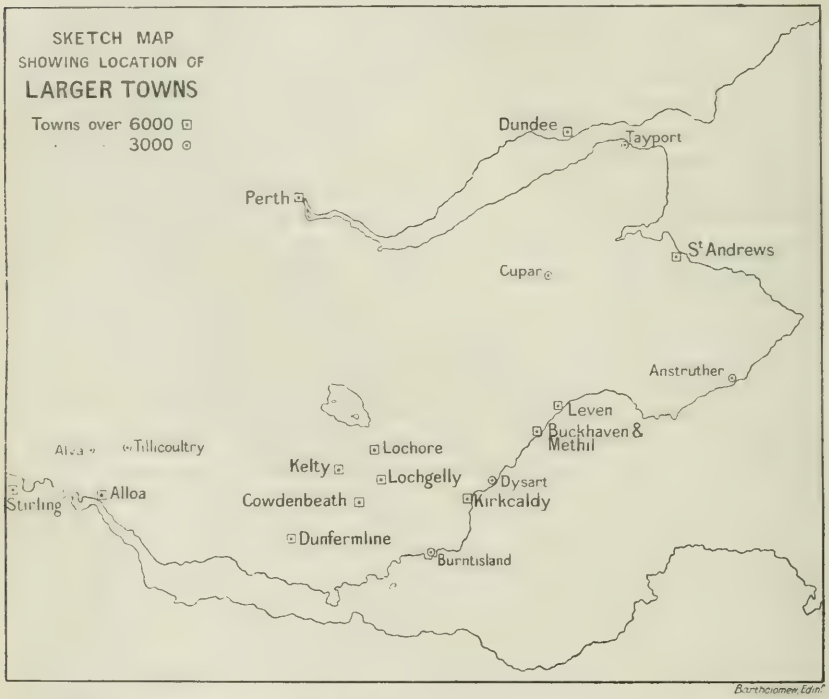
(b) *Population, Industries and Communications.*—This industrial progress has determined the present distribution of population. During the Middle Ages, population centred round the coast, particularly on the rim from Dysart to Ferryhill, where convenient harbours and a wool-producing hinterland encouraged the rise of numerous royal burghs. But in the modern development the determining factor was not convenient harbours or abundance of wool, but proximity to coal. From this it has resulted that the population has spread inland from those strips of coast where exposed coal measures occur, along the valleys towards the interior, but not so much up the highlands, which, being mostly of igneous rock, are of little economic value. In the valleys between the Burntisland and Saline hills, where the coal measures are least disturbed by igneous intrusions, a dense mining population exists. At the western end of this area is Dunfermline; at the eastern and more open end a string of coal ports, from Kirkcaldy to

Leven. To the south of this, the Burntisland hills form a sparsely peopled corner; to the north, a belt of similar character is formed by Benarty, the Cleish and Saline Hills. Then to the north of this belt of highland, and between it and the Ochils—another area incapable of supporting a population, and offering little attraction to mineral exploitation—lie the Devon valley and the plain of Kinross, where the better soils allow the growth of an agricultural population, gathering into small towns like Kinross and Milnathort,[1] where routes diverge and converge, and where are carried on such small industries as naturally arise in an almost purely agricultural area.

In this coal area of the west of Fife, which has attracted to itself the bulk of the population, lie the great towns of Fife. Of these, the two greatest, Dunfermline[2] and Kirkcaldy,[3] were already comparatively important before the Industrial Revolution, when proximity to the sea for cheap carriage and to water for bleaching, were essentials to the prosperity of their industries. Since then their situation near or on a coalfield has enabled their specialised branches, damask-weaving in Dunfermline and the manufacture of the coarser linens and oilcloth and linoleum in Kirkcaldy, to expand to enormous proportions. Neither can be said to owe very much to its position as a centre of diverging routes, for though Kirkcaldy stood at the fork of the two great coach routes from Pettycur Ferry (near Kinghorn), one branch going north to Cupar, the other east to the Neuk, the corresponding railway junction has moved north to Thornton; and Dunfermline is a rather artificial railway centre, certainly important but by no means inevitable. Kirkcaldy has, however, a fairly good port, which was nearest to the Strathleven field at the time when the smaller creeks had been largely deserted owing to the increasing size of vessels, when Leven was blocked by sand and Methil as yet not constructed; and though the whale fishing which Carlyle mentions in his *Reminiscences* is a thing of the past, the port is still among the three chief of Fife. Dunfermline has only recently reached the coast, when the burgh boundaries were extended to include the site of the new town expected to grow up round the naval base of Rosyth. The geographical recommendations for such a situation are obvious. From the time when Queen Margaret landed here under stress of weather, the little bay, sheltered by Ferryhill from east winds, has formed a harbour of refuge. In 1711 Sir Robert Sibbald wrote thus in his *History of Fife and Kinross*:—"To the east of Rosyth is St. Margaret's Bay, separated by a small neck of land from the bay of Inverkeithing: which if cutt would make the hill above the North Ferry an island, and this hill, which has a promontory stretching south into the firth over against Inch-garvie (a small island), if it were fortified and Inch-garvie and the south shoar opposite to it, it would secure all the western parts of the firth above that, and give great opportunity for docks, for building and repairing ships, and that with safety . . . and for laying up vessels of the greatest force and burden during the winter season." And now in these latter

[1] Milnathort, pop. 1052.
[2] Dunfermline, (1901) 25,500, (1911) 28,103.
[3] Kirkcaldy, (1901) 34,064, (1911) 39,601.

days, the political reason of the shifting of the centre of sea-power from the Mediterranean to the North Sea has drawn attention to this, the only natural site for a naval base on the East Coast, with convenient supplies of coal from Fife and oil from across the firth in Linlithgowshire. As yet the full effect of the new settlements has not been felt. Certainly the population of Inverkeithing increased by the influx of workers 80·9 per cent. in the period 1901-11,[1] and the authorities of Dunfermline have been warned that a population of 30,000 may have assembled within twenty years. A rapid increase in the population and importance of this enlarged burgh of Dunfermline is thus almost sure.



Most of the other royal burghs were not so favourably situated as Dunfermline and Kirkcaldy for the taking advantage of the new conditions. They were now on a stretch of coast which had not a very productive hinderland, they lay away from the coalfields, hence their industries rather survived than flourished. Their little creeks, which had proved sufficient in the days of small vessels, have now lost importance. And so Kinghorn [2] and Culross [3] are no longer great trading centres or even ferry-ports, but rather quiet coastal villages, and the same description could have been applied to Inverkeithing had not the new naval base wakened it to life. But there were at least two other royal burghs which did derive

[1] Inverkeithing, (1901) 1504, (1911) 2806.
[2] Kinghorn: pop. 1550.
[3] Culross: pop. 456.

some advantage from their position. Dysart[1] lay on the edge of the coalfield, and while its harbour was not sufficiently good to overcome the advantages of Kirkcaldy, it has been so far improved as to serve modern needs. In addition to being a mining centre, Dysart is enabled to support flax and linen works, and still preserves a vigorous burghal life independent of its larger neighbour. The other burgh, Burntisland,[2] is a curious example of a port with no immediately productive hinderland. It has an excellent natural harbour, and rose to importance as a railway ferry-port from Granton before the Forth Bridge was constructed. The company, in whose system it formed an indispensable link, spent something like £150,000 in the carrying out of improvements, with the result that it became a great coal-port, and the harbour revenue rose in twenty years (from 1860 to 1880) from £197 to £14,785. At this time, it must be remembered, Methil had not been built, and Leven was barred by sand. Thus, in addition to the ferry-traffic, Burntisland was as yet the nearest approach to a convenient coal-port, better even than Kirkcaldy. But it had its disadvantages. The coal-bearing area was in the central valleys, and though the port lay only some five or six miles away from such a mining centre as Cowdenbeath, the Binn lay between and prevented direct railway communication. The mineral lines had therefore to curve round the extremities of the hills by Dunfermline (where Charlestown could handle only a certain amount of the output of coal) from the west, or else down the Tiel valleys and round by Kinghorn—both routes involving fairly long detours. The excellence of the harbour overcame these disadvantages until (1) the construction of the Forth Bridge deprived Burntisland of its railway ferry; and (2) the increasing output from the north-eastern fringe of the coal area, Lochore, Auchterderran, and Lochgelly, forced the little haven of Methil into becoming a great port (1887). Burntisland is still a great coal-port,[3] but it is among the three burghs in Fife which showed a decrease of population[4] between 1901 and 1911.

With the exception of Dunfermline and Kirkcaldy these old royal burghs have not become great centres of population under the new conditions, and "new towns" have arisen as the coal mining gradually advanced inland. These lie in definite areas. To the north-west of Dunfermline a phenomenal increase[5] of population has been observed in

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[1] Dysart: pop. 4197.

[2] Burntisland: pop. 4707.

[3] Exports for 1911:—

	Tons	Value
Coal, etc.,	1,781,275	£853,221
All other articles,	...	501
		£853,722

[4] 2·9%.

[5] Parish of Beath:—

1801— 613	
1851— 1252	
1881— 5442	
1891— 8296	
1901—15,812	increase—54·0%
1911—24,351	

Parish of Ballingry:—

1801— 269	
1851— 568	
1881—1065	
1891—2275	
1901— 4156	increase 121·7%
1911—9214	

Parish of Auchterderran:—1901— 8626 | 1911—17,547 | increase—103·4%

the series of coal-producing valleys between the Cleish and Burntisland Hills, and farther east where these come down to the coast between Dysart and Leven.[1] Here arose the port of Methil. Formerly, the eastern port of the area had been Leven, which is still an important town[2] with its mines, its rope-walks, its sawmills, and creosote works; but its once busy harbour has been rendered useless by a bar of sand, and a new port had to be constructed about a mile away to the south, off the mouth of the Leven. It was opened in 1887, when 219,884 tons of coal were shipped; by 1911 this had risen to 2,564,869 tons of a value of over a million pounds. The population of the combined burgh of Buckhaven and Methil increased at the same rapid rate.[3] Inland from Methil at this seaward end of the central valleys lies a string of new towns, which sprang up with extraordinary speed as the coal-mining developed. Where the line of rail running inland from Methil crosses the trunk line from Edinburgh to Dundee, is the important junction of Thornton,[4] whence a line runs up the Ore to Dunfermline, passing such mining towns as Auchterderran (station Cardenden), Lochgelly[5] and Cowdenbeath,[6] centres of the huge population which has grown up within the last few decades between Leven and Dunfermline.

The routes are determined by the physical features and the population. The centres of the railway system are Dunfermline, Thornton and Kinross, and lines run along the parallel valleys, east and west, with two trunks from the Forth Bridge using the transverses to Perth and Dundee. The line to Perth twists up to Dunfermline, where it meets two parallel lines, one directly from Alloa through the thinly peopled Forest, the other along the coast by Culross. Then the line runs up the central valleys between the Burntisland and Cleish Hills to Cowdenbeath, until the break in the northern range between Benarty and the Cleish Hills allows entrance to the agricultural plain of Kinross. On the southern side of this pass stands the mining town of Kelty,[7] a terminus of the West of Fife electric tramways, which run thence to Cowdenbeath and Dunfermline, with extensions to Lochgelly and (in construction) to Lochore.

At Kinross lines branch off down the Devon valley to Alloa, and eastwards to Strathleven, while the main line turns northward through the conveniently situated pass of Glenfarg to Perth.

After leaving the Forth Bridge the Dundee line is kept close to the shore by the Burntisland Hills as far as Kirkcaldy; it then cuts across Strathleven to the pass of Markinch, sending out numerous branches.

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[1] Parish of Wemyss:—1901—15,031 } increase—53·7%.
1911—23,104 }

[2] Leven—6559.

[3] Combined burgh of Buckhaven and Methil—
1861— 2824
1901— 8621 } increase—75·7%
1911—15,149 }

[4] Thornton: 1147.

[5] Lochgelly—1901—5472 } increase—67·5%.
1911—9076 }

[6] Cowdenbeath—1861— 1148
1901— 8329 } increase—68·4%
1911—14,029 }

[7] Kelty—7502.

At Thornton the great coal-line which left the Perth trunk at Cowdenbeath, and runs down the Ore valley, crosses the northern line on its way to Methil, and from Thornton another line runs to Leven and the East Neuk. North of this a short line from Markinch reaches Leslie, where the peculiar excellence of the water, which attracted linen bleaching, etc., has now brought the manufacture of paper. It is to be noted that no line runs from the Largo Bay coast to Lochleven, probably because such a route would connect no great industrial or mining centres with the coast.

In addition to these various branches, the coastal rim of Largo Bay is served by an extensive tramway system from Kirkcaldy through Wemyss and Buckhaven to Methil and Leven.

A population due to a rapid development of mining is liable to sudden fluctuations, but as yet, supposing the present economic conditions to continue, there is little reason to foresee any sudden decline in the population or prosperity of the West of Fife: indeed, rather the reverse is to be expected from the report of the Royal Commission of 1905:—"The County of Fife, with the smaller quantities in Kinross, takes the leading position in Scotland in the matter of its coal resources. Besides the coal in these counties, probably two-thirds of that under the Firth of Forth will be worked by collieries in Fifeshire, so that the available resources at less than 4000 feet deep will amount to something like 5,700,000,000 tons or sufficient to maintain the present (1905) output for 930 years. While the output from the Firth of Forth will not rapidly increase for a great many years, when so much coal is available under the land, the output from Fifeshire is certain to advance till it occupies a leading position in the Scotch coal trade." The output of 1905 was 7,241,439 tons; in 1887, the date of the opening of the Methil dock, it was 2,459,395 tons, and by 1911, it had risen to 9,037,790 tons, most of it shipped across the North Sea to Scandinavia and the Baltic countries.

3. *Eastern Fife:* (a) *Historical Progress.*—North of the pass of Markinch, and eastwards of the Lomonds, lies the remainder of the peninsula, its physical features arranged in alternate belts of high and low ground running east and west. To the north the Ochils, now low hills cut by numerous transverse valleys and by one important longitudinal valley, are divided by Stratheden and the Howe from the Lomonds and the hills of the East Neuk, separated by the depression to the north of Markinch. To the south lies the coastal rim.

This area was most prosperous and wealthy during the Middle Ages, when its facilities for trade and its advantages of climate and soil attracted a considerable population. In it were eleven of the seventeen royal burghs of the peninsula. Even after the Union its commercial development kept pace with that of the West.

With its good climate and soil it derived most benefit from the modern improvements in agriculture. There was very little absolutely unproductive land. The soil of the hills, especially in the East Neuk with its volcanic outcrops, could be extensively cultivated despite exposure and elevation. The new drainage turned the swampy haughs

of the river valleys into good farming land. More particularly this took place in the Howe, where Loch Rossie disappeared about 1760, and the once marshy Howe is now successfully cultivated. With its dry summers and warm autumns the area was specially suited for wheat; and the improvement in the roads, the favourable market for cereals when the foreign supplies stopped with the outbreak of the Revolutionary Wars, the opening of the Forth and Clyde canal whereby the industrial population of the west could be reached—these causes all combined to make the early nineteenth century a time of great agricultural prosperity in the east. In addition it had never before been so industrially prosperous, for, in the early stages of the development of the linen industry, it had the same advantages as the west, the same facilities for importation of the raw material, numerous ports and, particularly in the Eden basin, excellent water. Hence the weaving was carried on as a domestic industry in the numerous small burghs and villages which lie around the slopes of the Howe — Freuchie, Falkland, Strathmiglo, Auchtermuchty—where the disadvantages of a comparatively interior situation were overcome by the advantage of superior water, and the convenience of the little port of Newburgh through the pass of Lindores. In the east, the ferry-ports of Newport and Tayport (Ferry-port-on-craig) opposite Dundee, were suitable centres for the importing of flax, to supply their own needs and the needs of the towns and villages of the Lower Eden, Cupar, Ceres and Dairsie. Then the burghs on the Firth of Forth, which had been almost ruined by the heavy duties on salt and the disappearance of the herring from their shores, revived when the duties were rescinded and the herring reappeared. Thus up to the time (about 1810) when steam-power was applied to the linen industry and the presence of a coalfield became an essential to industrial prosperity, the east had profited equally with the west from the new industrial conditions. But it had little coal, for the Ochils and Stratheden were composed of underlying sandstone, and the coal present in the limestone of the east Neuk was either so destroyed or broken up by igneous action as not to repay working on an extensive scale. While the west with its accessible coalfields drew to itself industry and population, the progress of the east slackened. It certainly did not stop altogether, for agriculture was pursued more and more scientifically and, on the whole, successfully, despite less advantageous markets after the importation of grain from abroad assumed larger proportions; the fishing flourished, and the linen industry was saved from extinction by the supreme excellence of the Eden water for dyeing and bleaching, and the accessibility of the interior to railway penetration. But there was no chance of great industrial development.

(b) *Population, Industries and Communications.*—Thus the distribution of population is unlike that of the west. There are nowhere presented the contrasts of the west, where an industrial area shows a dense population clustering in large towns along a valley, and, a few miles distant, an almost uninhabited mountain. In the east the hills, capable for the most part of some agricultural development, support a fair population, though,

of course, the larger towns and the more thickly peopled parts are in the valleys, particularly in Strathcden and the coastal rim. But there are no great centres of population, no towns of over ten thousand inhabitants, and very many little villages and burghs of a thousand or under, agricultural centres with perhaps a bleaching-field or a paper-mill, or, if on the coast, a few fishing-boats. For even yet the isolation which produced so many royal burghs in the Middle Ages still acts sufficiently to keep the lesser villages from absolute decay.

The position of these towns of the east on the coast and in the valleys secures for them a convenient railway system. The trunk line, which has been traced above from Thornton Junction to the pass of Markinch, cuts across the level of the Howe to Ladybank,[1] one of the two examples in the east of a new town. On the slopes round the Howe stand old burghs and villages like Falkland,[2] important when the Howe was a marsh and Loch Rossie a reality. Routes then curved through these villages, but now the railway cuts straight north through the level and leaves Falkland isolated. This new town rose in the centre of the Howe, where various lines break away down the valleys, enabling it by its central position to become a small agricultural centre. Eastwards a line runs to Kinross between the Ochils and the Lomonds, through little burghs like Auchtermuchty[3] and Strathmiglo,[4] now agricultural centres with sawmills or bleachfields. Northwards from Ladybank a line which, before the construction of the Glenfarg route, was the main one between Burntisland (for Edinburgh) and Perth, cuts through the Pass of Lindores to Newburgh,[5] a declining river port, and so to Perth. Westwards the trunk line to Dundee runs up Strathcden to Cupar, which, though the county town and one of the three greatest centres of population in the east, has a population of only 4112. It used to be an important route-centre at the foot of the marsh, but now routes diverge above and below it at Ladybank and Leuchars, and Cupar is only an important agricultural centre with one or two linen works. At Leuchars Junction, near the estuary of the Eden, one route goes southwards to St. Andrews, another to Tayport, the great railway ferry of the Tay before the Tay Bridge was constructed. The main line cuts through a gap in the swelling hills which now represent the Ochils, to the great bridge and Dundee. It receives two branches, one from Tayport and Newport, practically residential suburbs of Dundee, with jute and linen mills, the other from Lindores and Newburgh, through the longitudinal valley of the Motray, opening up an agricultural district with nothing more than a few hamlets.

Probably the most important line of the east of Fife is that running round the coast from Leuchars to Leven and Thornton. At Guardbridge, between Leuchars and St. Andrews, are important papermills, using the water of the Eden and the Motray, and the esparto grass imported at the nearest convenient port, Tayport. Then comes St. Andrews,[6] and strangely enough, with all its associations of priest and

[1] Ladybank (1861) 576, (1891) 1178, (1911) 1266.
[2] Falkland (1911) 830.
[3] Auchtermuchty (1911) 1396.
[4] Strathmiglo (1901) 966.
[5] Newburgh (1871) 2777, (1911) 1977.
[6] St. Andrews (1911) 7851.

presbyter, it must be classed as a "new town." After the Reformation it sank to the status of an agricultural village, its cathedral fell into decay, its university was threatened with removal to Perth. After the Union few manufactures could be introduced, for the harbour is inconvenient and the situation of the town unsuitable. Only a little fishing is carried on. The revival dates from the first years of the nineteenth century, when the littoral vegetation of Pilmuir provided excellent golf links, which have rapidly grown in popularity. Its other industry is education; it has a small but important university and several large secondary and boarding schools. To the south of St. Andrews the railway runs through an agricultural area where, as of old, the lack of harbours on an exposed coast has prevented the rise of fishing-villages, to Crail. From Crail to Earlsferry lie the once predominant royal burghs. Of these, the most important is Anstruther,[1] with the advantages of a large modern harbour and convenient access to the markets by rail. It is now the great fishing centre of Fife, but the same industry is carried on to a lesser extent by the smaller burghs, which have equal facilities for transport, but smaller harbours, not quite equal to modern demands. Behind them is a fertile agricultural region. They are best known, however, as summer resorts frequented by visitors from Dundee and Edinburgh. After passing Elie, the most popular of these little towns, the line runs past Largo to Leven and Thornton.

Conclusion.—From this description it will be seen that, compared with the Middle Ages, modern development has centralised and specialised industry. The determining factor of the coal area confines the great industrial centres to the west. By the economy of nature, agriculture as a predominant industry is confined to the east. Shipping has centralised in one or two ports like Burntisland, Kirkcaldy, and Methil. There is no longer a string of little burghs, each engaging in foreign commerce, each with its own little fleet. The density and relative distribution of population has changed. There is not one town of over 10,000 inhabitants in the east, and yet two of over 20,000 in the west. While the agricultural parishes and villages of the east either decrease or remain practically constant, the populations of the western parishes show rapid increases unusual in Scottish statistics. But the aggregate populations of the industrial counties show a continued increase since the taking of the first census in 1801. The inhabitants of Clackmannan county in 1801 numbered 10,858: by 1911 this had increased to 31,121. Almost the same ratio of increase is to be found in Fifeshire—in 1801, 93,743: in 1901, 218,840: in 1911, 267,734, where for the decade 1901-1911 the intercensal increase of 48,899, or 22·8 per cent., is surpassed in actual amount only by Lanark. In Kinross-shire, almost purely agricultural, the population has remained at the same figure. In 1801 it was 6725, by 1851, when the industries introduced into the county town were as prosperous as they ever were, it had mounted up to 8924, by 1911 it had fallen to 7528.

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[1] The three royal burghs of Anstruther Easter, Anstruther Wester, and Kilrenny practically form one town with a population of 4454.

But whatever degree of centralisation of industry Fife may have attained, there are abundant evidences that the old influences tending to decentralisation are still working. There are in the county of Fife twenty-eight burghs: this is more than in any other of the Scottish counties. The difficulties of the physical features have been evaded rather than overcome. The towns still lie string-like along the valleys, and the railway system resembles nothing more than the lines of a chess-board, with junctions innumerable. The old royal burghs, though deserted by the greater industries, are enabled by their position to preserve a certain degree of life as centres of a small local trade. The peninsular isolation is still in existence. The two bridges across the Forth below Stirling have not superseded but only supplemented the various ferries. Only three important railway routes connect Fife with the rest of Scotland by land, and all three—by the Carse of Clackmannan, by Glenfarg, or by the pass of Lindores—but follow old mediæval routes. The Tay ferries still ply briskly. In the interior the great lines of traffic are still east and west, not up and down the trunk lines, but across them.

Statistics, etc.

I.—*Population of Fife.*

	1901.	1911.	Increase.
Burghal,	136,087—62·2 %	163,407—61 %	27,320—20·1 %
Extra-burghal,	82,753—37·8 %	104,332—39 %	21,579—26·1 %

II.—*Industries.*

		1901.	1911.	Increase.
Males:	(1) mining,	15,583	26,634	70·9 %
	(2) agriculture,		6,858	
	(3) building trades,		5,352	
	(4) floorcloth making,		2,416	
	(5) flax and linen manufacture,		2,235	
	(6) paper making,		772	
Females:	(1) flax and linen manufacture,		8,112	
	(2) domestic servants,		5,781	
	(3) mining (above ground),		919	

III.—*Distribution, etc.*

Mining (males)—		Flax and linen manufactures (females)—	
Dunfermline,	1,956	Dunfermline,	2,520
Kirkcaldy,	1,594	Kirkcaldy,	2,290
Rest of County,	23,084	Rest of County,	3,302

IV.—*Agriculture of Fife, Clackmannan and Kinross*—1911.

	Clackmannan.	Kinross.	Fife.
Total area—acres,	34,927	52,410	322,844
Total acreage (under crops and grass),	15,561	34,698	251,486
Arable land,	9,242	22,266	176,273
Permanent grass,	6,319	12,432	75,213
Wheat,	375	90	12,992
Barley,	240	272	16,898
Oats,	3,001	6,483	39,888
Potatoes,	399	888	16,342
Turnips,	784	2,428	22,569
Horses—number,	727	1,172	10,696
Cattle,	3,623	6,655	47,412
Sheep,	15,177	34,040	107,594

V.—*Progress of Agriculture in Fife.*

	1856.	1911.
Wheat—acres,	34,099	12,992
Barley,	22,856	16,898
Oats,	42,328	39,888
Potatoes,	17,269	16,342
Turnips,	29,739	22,569
Sheep—number,	57,306	107,594
Cattle,	40,611	47,412
Horses,	12,258	10,696

THE LATE CAPTAIN ROBERT FALCON SCOTT, K.C.B., R.N., C.V.O., D.Sc.,

Livingstone Gold Medallist of the Royal Scottish Geographical Society.

AN APPRECIATION: By Dr. WILLIAM S. BRUCE.

ANTARCTIC exploration has been singularly free of disaster; so much so, indeed, that the general public have come to look upon these many recent expeditions to the South Pole and South Polar regions as comfortable excursions, and have concluded that it was much easier to get to the South Pole than the North Pole. The tragic end of Captain Scott and his companions has come, therefore, as all the greater shock. It is wonderful how all the early explorers came through almost unscathed. Neither Cook, Bellinghausen, Weddell, Biscoe, Wilkes, d'Urville, nor Ross had many or very serious mishaps, though many narrow escapes. Possibly of all these Biscoe fared the worst, though it is more than probable that Ross, had he succeeded in landing and wintering in M'Murdo Sound as he wished to, might have suffered in a way that would have been appalling. The reason, however, is that,

THE LATE CAPTAIN ROBERT FALCON SCOTT
K.C.B., R.N., C.V.O.
Commander of the British Antarctic Expedition.

since the time of Ross, Antarctic exploration was severely left alone for fifty years, because, with the exception of the *Challenger*, no further expeditions visited the Antarctic regions until the Scottish whalers, with an artist and men of science on board, worked and explored there, namely, 1892-93.

Consequently 1892 marks the date of modern Antarctic exploration. It was not until 1898 that anybody had experienced an Antarctic winter, and we were entirely ignorant of the conditions in the Antarctic regions up to that time except for a few summer months. It was the Belgians who first told us what an Antarctic winter was, and the following year a British expedition at Cape Adare was the first to winter on the Antarctic land. In contrast to this, more than three centuries have been spent in the exploration of the North Polar regions, and Europeans first wintered in the Arctic in the winter of 1630-31, when a British ship missed their companions in a fog and were compelled to winter in Bell Sound, Spitsbergen. Consequently Antarctic exploration began after three centuries' experience of exploration in the Arctic regions, during which time all the chief preliminary experiments had been made, resulting in a marvellous development in equipment and food supply. During the past twenty-five years especially an immense advance has been made in our knowledge of how to equip a Polar expedition, and especially in sledging, how to reduce weight of gear, and how to concentrate food supply into the smallest possible weight and bulk with the best possible nutrient power. The absence of disaster is consequently due to the sum of experience gained during that long period in Arctic regions, which have, as it were, been the training-ground of subsequent Antarctic work. That such a disaster has occurred at the present time emphasises the fact that the exploration of the Antarctic regions requires not only courage, perseverance, and foresight, but also experience.

Robert Falcon Scott had these qualifications. His first expedition was in the *Discovery* during the years 1901-1904. He was appointed to the command of that expedition, when it was decided that the leader was to be a naval man, because of his distinguished career in the service. He was at the time first lieutenant of the *Majestic*, flag-ship of the Channel squadron, and was appointed "Commander" on the eve of the departure of the expedition. The result of the work that he did then is given in his well-known narrative entitled *The Voyage of the "Discovery,"* and in the important scientific reports of the expedition which have been published by the British Museum, the Royal Society, and the National Physical Laboratory. The fact that there were at least three other expeditions working in the Antarctic regions at the same time, and that they were co-operating with him, greatly enhanced the value of the work done by Scott and his companions. The full significance of that work will perhaps be appreciated even more fully in years to come than it is at the present time.

It is a curious fact that it is seamen who have taken the lead in the exploration of the interior of the Antarctic continent, whilst landsmen have been paying more particular attention to the sea, and Scott was the

first of these land workers to do extensive work in that direction. It was he who first attempted a sledge journey on the Ross Barrier to a high southern latitude, attaining a position of 82° 17′ S., and it was he who followed Armitage's track up the Western Glacier and succeeded in reaching 146° 33′ E. on the inland plateau at an altitude of about 9000 feet. These two journeys of his were the two most extensive journeys that had been taken into the interior of Antarctica at that time. Besides Armitage other colleagues of his did extensive sledge work into the interior. Royds travelled south-east over the Ross Barrier, and Barne and Koettlitz travelled to the westward of Scott's southern track. These sledge journeys elucidated the topography and geology of these lands, and at the same time an extensive series of valuable observations were being carried out at the base station at M'Murdo Sound. With the ship Scott sailed along and closely investigated the whole of the Ross Barrier and confirmed the "Appearance of Land" mentioned by Ross at its eastern extremity, naming it after King Edward. He cruised along the whole of the coast of Victoria Land, visited Cape Adare, and pushed westward along the coast to about 166° W. He then made further investigations with the *Discovery* in the region of the Balleny Islands and the eastern extremity of Wilkes Land, altogether making the most extensive investigation of this part of the Antarctic regions for sixty years, namely, since the time of his predecessor, Sir James Clarke Ross.

But a few years elapsed and Scott was once more successful in securing sufficient funds to enable him to sail to the Antarctic. I say, sufficient funds, but I bear in mind that the funds were made sufficient by personal sacrifice on the part of his wife and himself, and even then he would scarcely have succeeded in getting away had he not induced the Treasury to vote him £20,000 and the Admiralty to give him considerable assistance.

There have been various statements as to what the object of Scott's recent expedition really was. It has been refuted that he was attempting to reach the South Pole. It is best to quote his own words where he says:—

"During the winter, great preparations will be made for a great effort to reach the South Pole in the following season. By that time we shall know what reliance can be placed respectively on the ponies, the dogs, and the motor sledges. But in any case a large party of men will be detailed for the southern party. Some of the scientific staff will remain at the wintering station through the summer. A small party will act independently in the western mountains for geological purposes; but at least sixteen, and possibly more, men will accompany the main transport agents on the road to the south."

Scott considered the achievement of the South Pole by no means a certainty. He was not without hope that either the ponies, the dogs, or the motor sledges might traverse the disturbed regions of the glacier, and that if this was possible the difficulty of the journey would be greatly diminished, but he was prepared to make the whole of the journey, once off the barrier, with the unaided efforts of men alone.

He considered that the only manner in which such a record as

Shackleton's could be beaten was by taking a larger party of men and sending sections of them back at intervals. He calculated that a party with the aid of a supporting party of quick members could hope to achieve a distance greater than it would have done had it been without a supporting party. All these careful considerations, which he discusses in the July *Geographical Journal* for 1910, make it clear that the objective of the southern journey was to attain the South Pole, and undoubtedly with this objective view he had the wish to plant the British flag at the Pole before any other. He himself stated that his plans were not altered by the presence of Amundsen in the field, and personally I do not believe that Scott, once he knew that a band of expert Norwegian ski-runners were in the field, would attempt anything in the way of a race. If the Norwegians were to reach the Pole at all it was practically an athletic certainty that they would reach it first. This they did, and in Scott's words "they deserved their luck."

From a geographical standpoint it might have been more profitable to have done the same journey over new ground, for Scott himself and Shackleton, his former colleague, had covered the whole road except one hundred miles. But little as we know at present of the scientific results of this expedition, they appear to be of great value. Along the whole route observations of pressure, temperature, wind, and so forth must have been taken. These will be of wide interest when worked out in conjunction with the meteorological observations taken, not only at Scott's own base stations at M'Murdo Sound and Cape Adare, but also with those taken by Amundsen, Mawson, Filchner, and the Argentines. It seems likely also that Scott would have taken in some form or other certain magnetic observations which would again be of great interest. Besides this, we learn that at Buckley Island, on the Beardmore Glacier, and on the side of the Cloud Maker, Wilson and Bowers made collections of fossils. The fossils at the former locality are well-preserved plants, probably of Upper Palæozoic or early Mesozoic age. Those from the latter are described as "corals of a primitive form typical of the early Palæozoic age," which have been found in Cambrian limestone. If so, there is proof that this range of mountains is actually continuous with those of Graham Land and South America. But whatever may be the result of the examination of these fossils, they will give us an important clue to the geology of that region. Amundsen secured rocks further east in approximately the same latitude, and also in Edward Land. Consequently, the collections of Scott's expedition will be an important factor in clearing up the geological problems of the whole of the region traversed by Amundsen and himself Topographically, undoubtedly Scott would confirm and correct the results of his own work and Shackleton's of previous years, and would undoubtedly fill in many gaps that there would be in such a survey on account of weather, or unavoidable personal error in observation. We can say, therefore, that the results of this great southern journey seem likely to be of great value to science, but

"The best laid schemes o' mice an' men
Gang aft agley,"

and regretfully it must be admitted that for some reason or other Scott's carefully made plans failed to bring him and his companions back again.

We mourn their loss, and our deepest sympathy goes out from our hearts to the widows and fatherless, and to those others to whom they were nearest and dearest.

It is easy for any one of us, sitting comfortably at home, to be wise after the event, to point out that by a different arrangement the great tragedy that has happened might have been averted. But, as one who has been in the field himself, I know how even the most expert and kindly critic at home may just fail to realise some crucial condition which would upset all his calculations. Scott himself has criticised no one, therefore why should we! He says:

"We took risks—we know we took them. Things have come out against us, and therefore we have no reason for complaint, but bow the head to the will of Providence, determined still to do our best."

"Wha does the utmost that he can
Will whyles do mair."

And Scott and his companions have done more, and what they have done has sent a thrill through this island Empire of ours that has been re-echoed through the whole civilised world. They have made us proud to think that we are their fellow-countrymen. They have set us an example of devotion to duty, of stern resolution to accomplish what they set themselves to do, and of self-sacrifice. Those rough notes and their dead bodies have indeed told the tale.

At the meeting of the Society, held in Edinburgh on February 14, Dr. Horne, Chairman of Council, who was in the chair, made the following remarks in regard to Captain Scott's Antarctic expedition :—

"In the unavoidable absence of Lord Stair it is my first duty to-night to express our profound sorrow at the tragic disaster that has befallen Captain Scott and his brave comrades in the Antarctic region. Many of you will remember the graphic account of his first successful expedition which he gave in this hall. On his departure as leader of the recent expedition Dr. Bartholomew said to him, 'We expect you to open the session of the Royal Scottish Geographical Society in November 1913, and you will be sure of a most cordial reception.' He replied, waving his hand, 'I'll be there. I will always remember my last reception in Edinburgh.' But our hopes have been sadly shattered.

"Geographers are aware that the recent expedition was not organised to make a dash for the Pole. It was based on a comprehensive plan, elaborately constructed, to obtain all available information regarding the evolution of that part of the continent which the members of the expedition had to traverse. The despatches sent home last year showed that so far their efforts had been crowned with success. The messages cabled within the last few days from Commander Evans clearly prove that not only had the South Pole been located, but materials of the highest scientific value had been obtained, which will throw light on the

age and structural relations of the mountain chains near the Beardmore Glacier. And yet, when nearing their goal, Captain Scott and his brave comrades had to face the grim reality that their lives had to be sacrificed, although success had been achieved. No more tragic situation could have arisen in the annals of Polar research than when Captain Scott sat down to pen the message to his countrymen which is inspired by the best traditions of the service to which he belonged. Every line of it vibrates with stern devotion to duty, unselfish loyalty to the cause he had at heart, and unflinching courage in the face of overwhelming odds. His message will endure. It adds glory to the race to which we are proud to belong. Need I express the hope that his pathetic appeal on behalf of the dependents of those who perished will be responded to by all parts of the British Empire. Several members of the Council of this Society think that the announcement should now be made that the Treasurer of the Society will be glad to receive subscriptions on behalf of those who have laid down their lives in the interests of geographical research."

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

At a Meeting of Council held on Tuesday, February 18, the following were elected Ordinary Members of the Society :—

Miss Penelope M. Ker.
Miss E. M. M. Thomson.
Mrs. A. L. Gemmell.
George Harding-Edgar.
W. A. Verel.
Lieut.-Col. C. de C. Etheridge, D.S.O.
Charles Matheson, M.A.

The following were elected Associate Members, viz. :—

Miss M. P. Gott.
Miss I. H. Brown.
Wilfrith Elstob, B.A.
S. Hyslop, M.A.
John M. Short, M.A.
William Byers.
Harry C. Crowden, M.A.
F. W. Taylor, B.A.
C. M. Lawrence.
John Cuthbert.
L. J. Wild, M.A.
Miss A. Corbett.
Miss E. G. Ball.

Diploma of Fellowship.

The ordinary Diploma of Fellowship was conferred upon the Rev. T. H. Walker, Uddingston, subject to his compliance with the prescribed conditions.

The late Colonel Bailey.

The following Minute relating to the late Colonel Bailey was unanimously adopted, and the Secretary was instructed to send a copy to Mrs. Bailey :—

"The Council expresses its profound regret at the death of Lieutenant-Colonel Frederick Bailey, R.E., LL.D., and its sense of the great loss that this Society has thereby sustained.

"Appointed Secretary to this Society in November 1892, Colonel Bailey brought to its service the benefit of the varied administrative experience he had had in India and elsewhere, and devoted himself to the work of this Society with the industry and enthusiasm which he had already displayed first in the service of his country, more particularly in connection with the Indian Forest Department, and afterwards in the University of Edinburgh, in which he was the first Lecturer on Forestry. After resigning the Secretaryship in 1903 he still showed his interest in the Society by acting as a Member of the Council and of various Committees. His services were continued to within a short time of his death, and his ready offer only a few months before his death, on the occasion of the Secretary's absence for two or three months from his duties, to undertake for that time the work of the secretarial office is an illustration of the kindly zeal and punctilious devotion with which those services were rendered. Of the value of those services the Council desires to place on record its high appreciation."

The Disaster to Captain Scott's Antarctic Expedition.

The Council unanimously adopted the following Minute with reference to the disaster to the Antarctic Expedition under the command of the late Captain Scott. The Secretary was instructed to send a copy to the Secretary of the Royal Geographical Society, to Mrs. Scott, and to other relatives of those who had met their death with Captain Scott:—

"The Council of the Royal Scottish Geographical Society, while placing on record an expression of their profound sorrow at the disaster that has befallen Captain Scott and his comrades, Captain Oates, Dr. F. A. Wilson, Lieutenant H. R. Bowers, and seaman Edgar Evans, on their return from their successful journey to the South Pole, desire to add an expression of their pride in thinking that the circumstances of their death, in strict and stern devotion to duty in the pursuit of geographical research, were such as to add glory to the race to which they belonged."

Bust of David Livingstone.

A letter expressing the cordial thanks of the Council was instructed to be sent to Captain Livingstone Bruce for the loan of a marble bust of his grandfather Dr. Livingstone.

Gaelic Place-Names.

It was agreed to revive the committee on the spelling of Gaelic place-names.

Congress Delegates.

Dr. J. Horne and Mr. H. M. Cadell were appointed delegates of the Society to the International Geological Congress to be held at

Toronto from August 7 to August 14. The Editor and the Secretary were appointed delegates to the International Geographical Congress to be held at Rome from March 27 to April 3.

Lectures in March.

Professor D'Arcy Thompson, C.B., will address the Society in Aberdeen, Edinburgh and Glasgow on the 11th, 13th and 14th respectively. The subject of his lecture will be "The North Sea."

Mr. George G. Chisholm, M.A., B.Sc., Secretary of the Society, will address the Dundee Centre on March 12. "The Transcontinental Excursion of the American Geographical Society of New York" will be the subject of his address.

Meetings to commemorate the centenary of the birth of David Livingstone will be held on the 26th and 27th in Glasgow and Edinburgh respectively, when an address will be delivered by Sir Harry Johnston, G.C.M.G., K.C.B.

Antarctic Exhibition.

Mr. Burn Murdoch and Dr. W. S. Bruce have arranged an Exhibition of Antarctic paintings and animals, together with clothing, equipment, etc., for Polar work, for the benefit of the Scott Memorial Fund. The Exhibition, which is under the auspices of the Royal Scottish Geographical Society, was opened on Wednesday, February 26, by the Lord Provost, and will remain open for about ten days.

GEOGRAPHICAL NOTES.

Africa.

Plant Geography of Algiers.—In a recent issue of the *Vierteljahrsschrift d. Naturforschenden Gesellschaft* in Zurich, there is an elaborately illustrated article by Messrs. Rikli and Schröter, with the collaboration of other authors, upon an excursion to Algiers and the margin of the Algerian Sahara, which is of interest from various points of view. The excursion was planned in connection with the Technische Hochschule in Zurich, but the party, which consisted of forty-two members, included, in addition to lecturers and students, a number of teachers from Swiss schools and scientists of other nationalities. The excursion lasted a little more than five weeks, and, though primarily botanical, the inclusion of a number of specialists in various branches of science allowed for the making of a great variety of observations, and a large number of characteristic photographs were also taken.

Polar.

The British Antarctic Expedition.—We allude elsewhere in the present issue to the tragedy which has clouded the close of this expedition. At a later period some account of the scientific results obtained

will be given; meantime we desire merely to place upon record the bare facts of the narrative as they have reached the civilised world in successive telegrams.

On February 10 the *Terra Nova* returned to New Zealand bringing with her the surviving members of the party. Commander Evans reported that Captain Scott and his companions, Lieutenant Bowers, Captain Oates, Dr. Wilson, and Petty Officer Evans, failed to return from the Polar trip in March 1912, as expected, and a party sent to meet them returned from One Ton Depôt without achieving this object. In November 1912 another party, well provisioned, found, eleven miles beyond the depôt, and 155 miles from the base camp, a tent containing the bodies of Captain Scott, Lieutenant Bowers, and Dr. Wilson, with all their records and many geological specimens. From these records it appears that the party reached the Pole on January 18, 1912, about one month after Captain Amundsen, and found the tent, etc., left by Amundsen. The return journey was difficult from the first owing to the lateness of the season, the bad weather, the heavy going and deficient food and fuel. On the Beardmore Glacier Petty Officer Evans broke down in health owing to the continued strain, and died on February 17, his death being accelerated by concussion of the brain produced by an injury received while sledging over the heavy ice.

Soon afterward Captain Oates also fell ill, both feet and hands being badly frostbitten, and on March 17 he left the tent in a state of extreme exhaustion, in spite of his comrades' protests. He was not seen again, and his heroic act was prompted by the desire not to keep back his companions on their journey. The others struggled on, but were overtaken by a blizzard, which seems to have raged for many days. The last entry in Captain Scott's diary—a singularly pathetic appeal to the nation—is dated March 25. Some echoes of the emotions which have been roused everywhere by the tragic end of the brave explorers will be found, as has been said, elsewhere in this issue.

The northern party, under Lieutenant Campbell, though happily none were lost, suffered also extreme hardship, spending the winter of 1912 in a snow hut at Terra Nova Bay with practically no food but seal meat, and not reaching the base camp till November 7.

General.

Ice Dangers in the North Atlantic.—It is of interest to note that the *Scotia*, the vessel formerly employed by the Scottish National Antarctic Expedition, has been chartered for special work in the North Atlantic during the coming spring, in connection with ice and risks to navigation. The *Scotia* is to be stationed off the east coast of North America, to the north of the usual shipping routes, to watch the break-up of the ice, and to report upon its movements towards the shipping routes. The vessel has been fitted up at Dundee, and has a Marconi wireless installation of long range, which will enable it to keep in touch with the wireless stations in Newfoundland and Labrador. The cost of the expedition is to be divided between the British Government and the

principal shipping lines, and there will be three scientific observers on board, who hope to make oceanographical and meteorological observations in addition to those on the movements of the ice. It is expected that the vessel will be ready to leave Dundee at the beginning of March, and her period of active service will include the spring months during which ice is a menace to navigation in the North Atlantic.

The Association of American Geographers.—Professor Isaiah Bowman informs us that this Association held its ninth annual meeting at New Haven, Connecticut, on December 27 and 28, 1912. "The sessions were held in Lampson Hall, Yale University, and an informal meeting took place on Friday evening at the Graduates' Club. In the absence of the President (Professor Salisbury), Mr. M. R. Campbell, the first Vice-President, presided. About thirty members attended.

"It is gratifying to the members to see the increasing number of papers on anthropogeography, regional geography and climatology that deal with human relations, a feature less prominent in the earlier programmes of the Association. Seven purely physiographic papers were presented out of a total of sixteen. Great interest is manifested in the *Annals* of the Association since the appearance of the first volume during the past year. The publication committee has performed a distinct service to geographic science in securing papers of high quality and a volume of excellent appearance.

"The newly elected officers for 1913 are as follows:—President, Henry G. Bryant: First Vice-President, Ellsworth Huntington: Second Vice-President, Charles C. Adams; Secretary, A. P. Brigham; Treasurer, F. E. Matthes; Councillor for three years, R. DeC. Ward. The publication committee appointed for two years (1913 and 1914) consists of R. E. Dodge, Editor, and Alfred H. Brooks, H. E. Gregory, and H. H. Barrows."

Commercial Geography.

Cotton-growing in the Sudan.—It was announced recently by the Prime Minister, to a deputation of the British Cotton-Growing Association, that a bill is to be drafted next session to authorise the Treasury to guarantee the payment of interest on a loan to be raised by the Government of the Sudan to the extent of three millions. The loan is intended to improve the condition of the land so that cotton can be grown in the Sudan, and particularly in the Gezira Plain. In this region there are some 5,000,000 acres of first-class cotton soil, of which only 2000 acres are now under irrigation. It is proposed to construct a dam across the Blue Nile at Sennar, and by means of canals to irrigate the plain. If, as preliminary experiments seem to show, cotton can be grown here as a winter crop, the irrigation works should lead to a great increase in the cotton supplies of England.

EDUCATIONAL.

A MEETING of the Association of Teachers of Geography in Scotland was held on Saturday, February 1, at eleven o'clock, in Sciennes School, Mr. Chisholm in the chair.

There was a good attendance, and a paper was read by Mr. T. L. Millar, the teacher of geography in the school, on the practical methods adopted by him for pupils in the supplementary stage. A brief account of Mr. Millar's methods will be given here, but is unavoidably held over this month owing to want of space.

A vote of thanks was unanimously passed to Mr. Millar on the motion of Mr. Cossar, and the Chairman expressed the thanks of the meeting to Mr. Crockett, the Headmaster of Sciennes School, who was present at the meeting, for his courtesy in allowing the use of the room for the holding of the meeting.

The next meeting of the Association is to be held in the Society's rooms on Saturday, March 8, at 11 A.M., when a paper upon "A Syllabus of Geography for Elementary Classes" will be read by Mr. James Cossar, M.A., Training College, Glasgow.

NEW BOOKS.

EUROPE.

The Botany of Iceland. Edited by L. KOLDERUP ROSENVINGE, Ph.D., and EUG. WARMING, Ph.D., Sc.D. Part I. *The Marine Algal Vegetation.* By HELGI JÓNSSON, Ph.D. London: John Wheldon and Co., 1912.

When completed, *The Botany of Iceland* will no doubt have a similar scope to *The Botany of the Færoes*, and judging from the volume now under review will be also a model of its kind. The present volume, entitled *The Marine Algal Vegetation*, by Dr. Helgi Jónsson, is a magnificent piece of work, the discussion of the relation of the algal flora to the temperature, salinity, etc., of sea-water being of great interest.

The coast of Iceland consists partly of rock and partly of sand, the former supporting a rich algal vegetation, while the latter is virtually a "desert." Fiords are numerous on the south-west, north-west, north, and east coasts, and vary greatly in size, some being about 10 by 12, while others are 18 by 10 geographical miles. The rocks of the coast consist mainly of basalt, but it is not so much the rock itself which influences the distribution of algæ as the nature of the surface. The movements of the ocean, such as tides, waves, and currents are naturally of great importance to the life of the algæ. Currents especially play a large part in determining the distribution of species. The warm water of the Atlantic Ocean here meets the cold water of the Arctic Ocean. The Gulf Atlantic Drift washes the south coast of the country, and sends an arm northwards along South-West and North-West Iceland. This, turning south along the east coast, mixes with cold water from the East Iceland polar current. From this brief indication it will be seen that complexities in the currents will be set up, but so far observations are too few to form opinions on their variation. Many interesting tables are given correlating depth of water, temperature, and salinity, and the following conclusions have been arrived at :—

"At the south coast warm pure Atlantic water of a high (above 35 ‰) and somewhat varying salinity occurs; at South-West Iceland there is a somewhat similar sea; at North-West and North Iceland there is Atlantic water mixed with cold water of low salinity from the East Greenland polar current; and, lastly, at East Iceland arctic water occurs (with a temperature of 0°–2° C., and salinity from 34·6 ‰ to 34·9 ‰), the East Iceland polar current mixing with water from the Atlantic current. The change of temperature in the surface-layers of the water, the cooling process during winter and the heating process during summer reaches down almost as deep as the algal vegetation, and is consequently of no slight importance to the latter." Regarding the temperature of water in the interior of small fiords, it is found that it is nearly the same from the surface downwards to the bottom, but in the larger fiords the temperature decreases regularly with the depth. In the fiords the salinity varies according to the amount of fresh water, and, where low, excludes certain species of algæ; generally it increases with depth.

Cambridge County Geographies. Forfarshire. By E. S. Valentine, M.A. Cambridge University Press, 1912. *Price* 1*s.* 6*d.*

In this—one of the latest volumes—the scope is similar to that of other books in the same series. Interesting statistics are given regarding climate, rainfall, agriculture, shipping, etc., which cannot fail to be of use to teachers of practical geography in Scotland, and the latest rainfall map of Scotland is reproduced. To one unacquainted with the Forfarshire dialect the section dealing with people, race, and dialect should prove of great interest. As in other members of the series the illustrations are excellent.

Handbook to Belgium, including the Ardennes and Luxemburg. London: Ward, Lock and Co., 1912. *Price* 2*s.* 6*d.*

This is the sixth edition of a comprehensive and moderately priced guide-book which is well illustrated by photographs and has a number of town plans, etc., as well as a general map on a small scale.

Southern England: Coast and Countryside. Edited by Prescott Row and Arthur Henry Anderson. London: The Homeland Association, 1912. *Price* 1*s.*

A useful little compilation, forming No. 5 of the Homeland Reference Books, and containing articles on the Cathedrals of Southern England, on motoring, golf, etc., with alphabetically arranged notes on the towns, health resorts, etc., of the district. It is illustrated by some good photographs, and contains a list of books dealing with the region considered. Among the practical details given in regard to the towns we find in many cases the average rents and the rates, both points of considerable interest alike to the geographer and intending resident; the very heavy rates in many places are remarkable.

ASIA.

Recent Events and Present Policies in China. By J. O. P. Bland. London: William Heinemann, 1912. *Price* 16*s.*

It is not possible to notice here in detail Mr. Bland's exhaustive account of the causes which have led to the upheaval in China and his criticism of the policy pursued by the Great Powers in that country in the last few years, although his book is without doubt one of the most important contributions which have been made to the literature of the subject; but those who have read his *China Under*

the Empress Dowager, which he wrote in collaboration with Mr. E. Backhouse, will not require any further recommendation to induce them to give serious attention to Mr. Bland's views, as they are set forth in the large volume before us. He is not in agreement with Dr. Morrison, the former correspondent of the *Times* in Peking, and now the political adviser to the Republic, who sees in the revolution every cause for hope that a regenerate China will arise in the near future. Rather is Mr. Bland one of those who can see no good prospect of a settled state of affairs issuing from a so-called Republic, under the influence of a large body of half-educated youths of the student class who have climbed into office on the strength of the "Western learning" acquired by them in Japan, Europe, or America, and who now go to swell the crowd of expectant office-seekers. He sees in this class an element which will go to increase and prolong the prevailing unrest. A number of these youths of the Young China party have adopted the profession of arms, and, since the revolution, "hold rank to which neither their age nor their achievements entitle them." Mr. Bland regards the Republic as an accident—a result of the revolt against the Manchu régime which broke out at Hankow and other cities in the Yangtsze valley, in October 1911. He already sees throughout the country, and especially north of the Yangtsze, signs of a revolution against the new order and the band of southern hot-heads who lead and maintain it.—"The Republic is the offspring of unexpected opportunity, out of sudden chaos; accidental in its birth and foredoomed to early demise," while "Young China, as at present constituted, will pass, the shadowy fabric of a restless dream. An inevitable reaction will restore the ancient ways, the vital Confucian morality, and that enduring social structure whose apex is the Dragon Throne. But Young China, at its passing, will not have been in vain. Something of the Utopia of its visions will remain, to renovate and modify that ancient structure." Economic causes, rather than political, go to produce that unrest which is, and always has been, more or less prevalent in a country like China, in which the chronic condition is that of a struggle for life, unequalled in any other part of the world. The main factor in producing this condition is, as Mr. Bland well expresses it, "the procreative recklessness of the race, that blind frenzy of man-making, born of ancestor worship, which, despite plague, pestilence, and famine, battle, murder, and sudden death, persistently swells the numbers of the population up to, and beyond, the visible means of subsistence." To the great mass of such a population, immersed in the grim fight for bare subsistence, forms of government, be they monarchical or republican, can have but little importance. In estimating the factors which tell against permanence of the Young China régime Mr. Bland also gives prominence to the absence of religious inspiration, to the want of an authoritative aristocracy, and, most of all, to the lack of common honesty in public affairs. So that we are not unprepared for his conclusion that China is only likely to find her salvation in the coming of the strong man who can set up an autocracy. Whether the present President, Yuan Shih-k'ai, will prove to be that man time only can show.

Mr. Bland gives his readers some interesting character sketches of Young China's leaders:—of Wu Ting-fang (a barrister of Lincoln's Inn and until lately Chinese Minister to the United States), of Wen Tsung-yao, Tang Shao-yi, and, last, but not least, of Sun Yat-sen, "the perambulating Conspirator-in-Chief of the Radical Republicans"; but these sketches are too long to quote here.

The long protracted negotiations in connection with international loans and railway finance are detailed with great minuteness, and the history of them is brought up to last October. Mr. Bland has scant belief in the honesty of many of the negotiators, either foreign or Chinese, and he criticises severely the policy of the British Foreign Office during the last few years, which he thinks has resulted

in a loss of position and prestige. He regards it as inevitable that Russia and Japan will eventually absorb Mongolia and Manchuria, in spite of the treaties to maintain the integrity of China; and, as for the Yellow Peril, he sums up his well-reasoned conclusions with these words: "If there be any menace to Europe in Cathay, it lies in the fierce struggle for life of three hundred million men who are ready to labour unceasingly for wages on which most white men must inevitably starve."

The vexed question of the Opium Traffic, and of Britain's connection therewith, come in for a special chapter, in which the pros and cons of the controversy are stated both with fairness and knowledge; and it is to be noted that what the author describes as Young China's deliberate intention to violate the new opium agreement with Great Britain is already taking shape as we write.

The Malay Peninsula, A Record of British Progress in the Middle East. By Arnold Wright and Thomas H. Reid. London: T. Fisher Unwin, 1912. *Price* 10*s.* 6*d. net.*

To use their own words, the aim of the authors is to present "a comprehensive account of the development of British influence in the Middle East from the earliest times to the present day." They have not spared either labour or research in the accomplishment of their task, and we may congratulate them on the production of a very readable and succinct story of the growth of empire in the Malay Peninsula.

The beginnings of British power date from the occupation of the port of Bencoolen, on the south-west coast of Sumatra, by the East India Company in June 1685. The main attraction to Bencoolen lay in its nearness to the pepper-growing districts of the island, and the company hoped by opening a station there to be able to wrest a share of the trade from their Dutch rivals. Owing to the swampy nature of the soil, and the coral reefs which render it difficult of access from the sea, Bencoolen never was a success as a settlement. The early records quoted by the authors furnish a dismal story of losses by sickness—"'Ffeavours and flux' were the chief causes of death",—and of dissensions amongst the Company's officers. It is interesting to learn that the company made a trial of sending out German emigrants, men and women, to Bencoolen about the year 1780: but most of these poor people speedily fell victims to the climate. The port was ceded to Holland by the London treaty of 1825, and so ended British rule in Sumatra.

The real foundation of the Straits Settlements dates from the concession of the island of Penang, made by the Sultan of Kedah to Francis Light, who was acting for the Government of Madras. The consideration paid to the Sultan took the shape of an annual subsidy of 9000 Mexican dollars, which seems a trifling figure, viewed in the light of the later importance of the place, and the British flag was hoisted on 11th August 1786. Better known to fame than the name of Francis Light is that of Sir Stamford Raffles, although the nation also owes a deep debt of gratitude to the former. Raffles was sent out to Penang by the East India Company in 1805, and, as is well known, it is to him we owe the possession of Singapore. How he raised himself to front rank by his own native merit, and was made Lieut.-Governor of Java when that island was taken from the Dutch in 1811, are matters of history: but it is worth recalling that he was brought into touch with John Leyden, when the Border poet and orientalist went to Java in the train of the Earl of Minto. A visit to Calcutta, which he made in 1818, gave Raffles the chance to induce the Marquess of Hastings, the then Governor-General, to found a new station to the eastward of Penang, in order to maintain British supremacy at the eastern end of the Straits of Malacca; and on the 29th January

1819, Raffles had the satisfaction of hoisting the Union Jack at Singapore. This far-seeing man set to work on founding the new settlement, constituting it a free port from the start; and a free port it has remained, to the infinite advantage of British trade in Malaya. The names of Francis Light and Stamford Raffles, belittled in their lives, now stand on the roll of fame as among the greatest of empire builders.

The history of British development in the Malay States is given in some detail, and we would draw special attention to the account of the states of Kelantan and Trengganu, which have so recently come under British protection, but both of which are already in a fair way to become flourishing territories. There has been so little known hitherto of these two states that the authors' description of them will be novel to many. We can only refer here in passing to the dramatic history of the rise of the Federated Malay States of Perak, Selangor, Pahang, and Negri Sembilan. In the latter part of the volume will be found interesting chapters on the development of the rubber industry in Malaya, on mining, and other matters, and we can cordially recommend this book to the attention of our readers.

Things Seen in Palestine. By A. Goodrich-Freer, F.R.G.S. With fifty Illustrations. London: Seeley, Service and Co., 1913. *Price* 2*s. net.*

This chatty, delightful series of "Things Seen" has received an interesting and useful addition in *Things Seen in Palestine.* Mrs. Goodrich-Freer has made the country her own by her works, and she describes with a vivid pen the things seen in a land that never fails to sharpen the pencil point of every traveller. The glimpses she affords of the desert, the village, the town, the social and the religious life are captivating. She speaks with a fulness of knowledge that makes every sentence tell.

AFRICA.

South African Geology. By G. H. L. Schwarz. London: Blackie and Son, 1912. *Price* 3*s.* 6*d. net.*

This is an interesting little book, whose title, to our mind, does not quite adequately describe its contents. It is really an introduction to geology for the use of South Africans, *i.e.* the examples and illustrations are mostly taken from that region, and the section on stratigraphical geology is practically limited to South Africa. The book thus differs from the ordinary run of small text-books in containing a mass of material not found in them, and in omitting much that they include. The figures also depict conditions unfamiliar to most geologists, and have the same air of freshness as the rest of the book. Professor Schwarz is not afraid to state vigorously his own opinion on subjects which to many geologists seem as yet unsettled, and has therefore produced a very attractive little book, in places much condensed.

Life of a South African Tribe. By Henri A. Junod. Vol. I. *The Social Life.* London: David Nutt, 1912. *Price* 3*s.* 6*d. net.*

The author was attached to the Swiss Romande Mission, and spent fifteen years with the Thonga Clans, a Bantu race of the East African Coast. (Their country extends roughly from 22° S. lat. to St. Lucia Bay, and from 32° East long. to the sea.) Most of the book is a minute literal transcription of the ceremonies, tabus, laws and customs of these clans as taken down from the reports of four or five natives in whom the author has confidence. It is, therefore,

a human document of great importance to anthropologists, and full of interesting information regarding the clan system, the relationships, language, and especially the rites of birth, puberty, marriage, burial, war and chieftainship. The peculiar lubricity of Bantu life is here given with an accuracy which one might think unnecessary were it not that this, the governing factor in negro nature, is always forgotten by most missionaries, and the public generally.

There are many interesting points in the book. The graves described resemble those in certain cemeteries in Crete. The occasional use of human flesh as food is explained by the author as a mystic ceremony. The patriarchal government by the chief, who is in a sense the tribe, is carefully described. There are many misprints, *e.g.* "synonimous," "consaquinity," p. 242, "proferential," p. 247, and occasionally unusual expressions which, however, cannot but be expected if the author is writing in a foreign language.

Handbook of British East Africa, 1912-13. Illustrated and with Two Maps. Compiled by H. F. Ward and J. W. Milligan. Second Impression. London: Sifton Praed and Co., Ltd. *Price* 4*s.* 6*d. net.*

This handbook should prove exceedingly useful to intending settlers and also to visitors to the country. It gives a considerable amount of detail as to the various crops which are being grown in the region as well as in regard to cattle-rearing, ostrich-farming, and so forth, and also much information for sportsmen. We note that sisal hemp is doing well, and is expected to become an important crop in the highlands, while there are also good prospects for rubber. On the whole, however, stock-farming seems the most profitable industry, but it demands considerable initial capital.

AMERICA.

A Holiday Trip to Canada. By Mary J. Sanson. London: The St. Catherine Press, 1912. *Price* 2*s.*

This is an unpretentious little book giving a very detailed account of a short visit to Canada, even the meals on board ship being fully described. It will appeal chiefly to the unsophisticated.

Joseph Pennell's Pictures of the Panama Canal. London: William Heinemann, 1912. *Price* 5*s. net.*

This is a collection of photographs of the Panama Canal made by Mr. Pennell for the *Century Magazine* and the *Illustrated London News*, and its main interest is that it gives us a vivid idea of many parts of the canal during the process of construction. When the canal is completed the appearance of the places, which now resemble busy work-yards, crowded by workmen and machinery, will be inevitably changed. Mr. Pennell has an introductory chapter in which he cordially acknowledges the welcome he everywhere received, and he naturally writes with pardonable enthusiasm and effusive patriotism of the splendid work, both engineering and sanitary, which is being achieved by his fellow-countrymen. To each picture there is appended an explanatory note.

The Flowing Road: Adventuring on the Great Rivers of South America. By Caspar Whitney. London: William Heinemann, 1912. *Price* 12*s.* 6*d.*

This volume gives an account of five separate expeditions in South America, largely by canoe, and chiefly on streams more or less connected, hence the title. The author shows himself an indomitable and intrepid traveller, capable of sur-

mounting many difficulties which might well have daunted a more timid soul. Though some of the journeys had a special purpose, as for instance the hunting of the jaguar, the author states frankly that for the most part the impelling motive was merely a desire to "see things," and he certainly succeeded in seeing a good many, and conveys many vivid impressions to his readers.

The book is illustrated by a series of photographs for whose deficiencies the author apologises, but which, nevertheless, give an excellent idea of the regions traversed.

With the Indians in the Rockies. By James Willard Schultz. London: Constable and Co., 1912. *Price* 4*s.* 6*d. net.*

This book contains the early recollections of Thomas Fox, who travelled to Fort Benton in 1856. He was plundered by the Indians in the Rockies, and had to pass the winter in the mountains with an Indian friend, where they suffered great hardships. The book is full of exciting adventures and hairbreadth escapes from avalanches, bears, Indians, etc. The conditions of frontier travel in 1856-8 are well described.

Les États-Unis du Mexique. By Comte Maurice de Périgny, Chargé de missions. With a Preface by Professor Marcel Dubois. Librairie Orientale et Américaine. Paris: E. Guilmoto, 1911. *Price* 5 *fr.* 50.

The author of this book first deals with the history of ancient Mexico and passes briefly on to the Spanish Conquest and in chapter ii. he outlines the history of the Mexican Republic. The laws and constitution, public instructions, army finances, are next taken up, and in chapter vi. the commerce and industry are treated of. From chapter viii. to chapter xvii. (the last chapter) the book describes the different states and districts in order, and much attention is given to the mining industry in each state. To French readers who wish to have a general sketch of the country mainly from the tourist's point of view, the book may be interesting. It is without an index, and does not profess to deal profoundly with that immense country in which the author's countrymen had such unfortunate political experiences a generation ago.

GENERAL.

A Book of the Wilderness and Jungle. Edited by F. G. Aflalo, F.R.G.S. London: S. W. Partridge and Co., Ltd. *Price* 6*s. net.*

Here is another book on wild beasts and sport at the hands of the well-known writer, Mr. Aflalo, who is a recognised authority on this subject. It purports to be "a kind of nature-study book on the larger scale, and introduction to the study of big game in our overseas possessions," written for the "thousands of young fellows (who go) every year to India, Africa, Canada, or those farther colonies that lie on the other side of the world." In it the reader will find abundance of information regarding the big game of every part of the world, their localities and habits, the difficulties and the dangers of hunting them. The book is copiously illustrated with good stories of thrilling and exciting adventures experienced by such doughty shikaris as Selous, Lee Warner, de la Poer and Seton Karr. Mr. Aflalo is, of course, a real sportsman, and writes wisely and earnestly on the necessity of protecting efficiently, ere it be too late, those kinds of wild animals and birds which now run the risk of extinction, and in this matter he denounces those who kill

game merely to be able to brag about the size of their bag or to establish a record. In this respect even Mr. Roosevelt comes in for censure on account of some of his African exploits. The inexperienced sportsman will do well to ponder the pages of the chapter on "the vengeance of the wild," in which are mentioned a number of the incidents in which the most experienced and fearless of sportsmen have paid for their sport by severe wounds or death. The illustrations of this book in colour and black and white are by Mr. E. F. Caldwell.

Palæolithic Man and Terramara Settlements in Europe. By Robert Munro, M.A., M.D., LL.D. Edinburgh: Oliver and Boyd, 1912. *Price* 16*s. net.*

This handsome volume will be gratefully received by all who are interested in the history of mankind, and is indeed a noteworthy addition to British Anthropology. The plates are not only numerous, attractive, and beautifully clear, but many of them will be new to British readers, which is rather an unusual circumstance in illustrations of prehistoric men and beasts. The first part consists, with the exception of a few changes in phraseology, of the first course of Munro Lectures in 1912. The second part practically forms the Dalrymple Lectures on Archæology, given in Glasgow in 1911.

The author begins with an interesting discussion on man's place in the organic world, and passes on to the story of the Ice Ages and chronological problems. Most of the first part, however, is devoted to a detailed and careful description of all the various stations in Britain, Belgium, France, Italy and other countries where fossil man and his artifacts have been discovered. In enumerating all this evidence, Dr. Munro includes many finds which, as he shows, are not now considered to be of palæolithic age. This information is, of course, of the greatest possible value to all students of the subject. Then follow chapters on the palæolithic races, and on the supposed hiatus between the palæolithic and neolithic periods. In the second part, the terramara settlements are described, and full lists are given of the implements, bones, etc., found in each of them. The final chapters deal with the culture of the Terramaricoli, the lake dwellings in the Po Valley, neolithic huts, the terpen and other pileworkers of Holland, Bosnia, and a few other countries.

It will be seen that the arrangement is strictly geographical, and one cannot help a regret that Dr. Munro has not given more space to his discussion of the general questions involved. During the last two or three years Dr. Penck and Professor Sollas in this country have suggested definite chronologies for the Ice Ages. The Acheulean period is dated by the latter as towards the culmination of the third glacial episode at about 34,000 B.C. Even if these dates should be taken as provisional, there is great advantage for the student, and especially for the man in the busy streets of to-day, in a definite working hypothesis. Moreover, owing to the works of Montelius and others, the chronology of the bronze and iron ages in Italy is surely fixed at any rate provisionally. Still, the beautiful illustrations, full lists and excellent bibliography of the Terramara settlements given in this volume are of great value, even though some of the information has already been supplied to British readers by Mr. Peet's book published in 1909. Indeed, prehistoric and proto-historic man in Italy has now, thanks to this volume, been most carefully attended to, and one wishes that the same could be said of his British contemporaries.

The volume is in every way beautifully turned out, and misprints are not at all evident. On page 369 a beam is described as 24½ *inches* long. Probably this should be feet, not inches.

From Pole to Pole. A Book for Young People. By Sven Hedin. London: Macmillan and Co., 1912. *Price* 7*s.* 6*d. net.*

Dr. Hedin's book has been translated, abridged, and edited for the use of young people, and with its numerous illustrations and its vivid descriptions should admirably fulfil its purpose of arousing interest in travel and exploration, and in the manners and customs of other lands. There are numerous sketch maps, though the scale of these is very small. Dr. Hedin's own travels are fully described, and in addition to accounts of journeys through the civilised regions of the world we have tales of exploration of all ages retold, so that the book contains both history and geography, and is full of human interest.

The Origin and Evolution of Primitive Man. By Albert Churchyard. London: George Allen and Co., 1912. *Price* 5*s. net.*

In this book Dr. Churchyard, with the aid of many italics, puts forward a view of human evolution which he prefaces with the observation that "the evidence in favour of my contentions is critically correct." Some of the points dealt with seem to us of interest, but the author rather spoils his chance of a hearing by his somewhat intemperate language in regard to other investigators.

EDUCATIONAL.

Dent's Historical and Economic Geographies. By Horace Piggott and Robert J. Finch. Book I. *World Studies.* London: Dent and Co., 1912. *Price* 3*s.* 6*d.*

This is the first volume of a new geography which is to be issued in six books, the remaining volumes treating of the continents and of the British Isles and the British Empire in more detail. Well and elaborately illustrated, the present volume shows in its text some remarkable deviation from tradition. Thus we have a considerable amount of geology, and a very full treatment of prehistoric man, illustrated by pictures taken from *From Nebula to Man* and other sources. From these latter chapters, mostly based, we think, upon popular or semi-popular works, the student passes on to a consideration of climate along more or less the usual lines. We are not satisfied that this is a wholly desirable method, on account of the great uncertainty which exists as to the interpretation of the evidence at present available in regard to the early records of man. The position of Pithecanthropos and of Neandertal man in the evolution of the human race, the significance of eoliths, these with many related problems are still being fiercely debated, and we feel that it is undesirable that subjects of this kind should be discussed in school-books under circumstances which make it impossible to indicate clearly the large element of uncertainty which exists. The authors' purpose could, we think, have been better attained by a brief discussion of the various forms of human societies which exist at the present day, and this could be done with certainty and in detail.

The book, however, contains a great deal of interesting matter, and many of the pictures are attractive.

Our Own and Other Lands: The World. London: M'Dougall's Educational Co., 1912. *Price* 2*s.*

This is a geography of the reading-book type, illustrated by a very admirable series of pictures and some coloured maps. It includes some elementary history in addition to geography. The book on the whole is written in a clear and interesting style, though we object to malaria being called a "poisonous emanation."

The absence of the author's name, also, is to our mind a real blemish. Otherwise the book should prove useful as a general summary of world geography.

BOOKS RECEIVED.

Lippincott's New Gazetteer: A Complete Pronouncing Gazetteer or Geographical Dictionary of the World. Edited by ANGELO HEILPRIN and LOUIS HEILPRIN. With a Conspectus of the Thirteenth Census of the United States. Royal 8vo. Pp. x+2105. *Price* £2, 2*s. net.* London: J. B. Lippincott Co., 1912.

A Scientific Geography. Vol. VIII. *South America.* By ELLIS W. HEATON, B.Sc., F.G.S. Crown 8vo. Pp. 90. *Price* 1*s. net.* London: Ralph, Holland and Co., 1913.

A Pronouncing Vocabulary of Geographical Names, with Notes on Spelling and Pronunciation and Explanatory Lists and Derivations. By GEO. G. CHISHOLM, M.A., B.Sc., F.R.G.S. Crown 8vo. Pp. vii+102. *Price* 1*s. net.* Glasgow: Blackie and Son, Ltd., 1913.

With the Conquered Turk: the Story of a Latter-Day Adventure. By LIONEL JAMES. Crown 8vo. Pp. 370. *Price* 2*s. net.* London and Edinburgh: T. Nelson and Sons, 1913.

Panama Canal: What it is; What it means. By JOHN BARRETT. Demy 8vo. Pp. 120. *Price* $1 *net.* Washington, D.C.: Pan-American Union, 1913.

Scientific Papers. By J. Y. BUCHANAN, M.A., F.R.S. Vol. I. Demy 8vo. Pp. xii+314. *Price* 10*s.* 6*d. net.* Cambridge: University Press, 1913.

Deuxième Expédition Antarctique Française, 1908-1910. Commandée par le Dr. JEAN CHARCOT. *Étude sur les Marées.* Par R. E. GODFROY. *La Flore Algologique.* Par L. GAIN. Cartes. Three Volumes. Demy Folio. Paris: Masson et Cie, 1912.

A Handbook of Geography. By A. J. HERBERTSON, M.A., Ph.D. Vol. II. *Asia, Australasia, Africa and America.* Crown 8vo. Pp. xii+681. *Price* 4*s.* 6*d.* London and Edinburgh: T. Nelson and Sons, 1913.

With the Turks in Thrace. By ELLIS ASHMEAD-BARTLETT, in collaboration with SEABURY ASHMEAD-BARTLETT. Illustrated. Demy 8vo. Pp. x+335. *Price* 10*s. net.* London: William Heinemann, 1913.

With the Victorious Bulgarians. By Lieutenant HERMENEGILD WAGNER. With fifty-five Illustrations and six Maps. Demy 8vo. Pp. ix+295. *Price* 7*s.* 6*d. net.* London: Constable and Co., Ltd., 1913.

How England Saved China. By J. MACGOWAN. With 38 Illustrations. Demy 8vo. Pp. v+319. *Price* 10*s.* 6*d. net.* London: T. Fisher Unwin, 1913.

Aborigines of South America. By the late Colonel GEORGE EARL CHURCH. Edited by CLEMENTS R. MARKHAM, K.C.B. Demy 8vo. Pp. xxi+314. *Price* 10*s.* 6*d. net.* London: Chapman and Hall, Ltd., 1912.

Les Sociétés Primitives de L'Afrique Équatoriale. Par le Docteur ADOLPHE CUREAU. Un vol. in-8° écu. Pp. xii+420. *Prix* 6 *frs.* Paris: Librairie Armand Colin, 1912.

Three Years in the Libyan Desert: Travels, Discoveries and Excavations of the Menas Expedition. By J. C. EWALD FALLS. Translated by ELIZABETH LEE. With 61 Illustrations. Demy 8vo. Pp. xii+356. *Price* 15*s. net.* London: T. Fisher Unwin, 1913.

A War Photographer in Thrace: An Account of Personal Experiences during the Turko-Balkan War, 1912. By HERBERT F. BALDWIN. With 36 Illustrations

from Photographs by the Author. Demy 8vo. Pp. 311. *Price 5s. net.* London: T. Fisher Unwin, 1913.

The Story of the Forth. By H. M. Cadell, D.L., B.Sc., F.R.S.E., M.Inst.M.E. With 75 Illustrations and 8 Maps. Medium 8vo. Pp. xvii + 299. *Price 16s. net.* Glasgow: J. Maclehose and Sons, 1913.

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THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

THE PLANT ECOLOGY OF BEN ARMINE (SUTHERLANDSHIRE).

By C. B. Crampton, M.B., C.M., and M. Macgregor, B.Sc.

(*With Map and Diagram.*)

I. The Physiography and Distribution of the Vegetation.

The ecological survey of the Ben Armine district, the results of which are given in the following paper, was carried out at intervals during the summers of 1910-12. The accompanying map has been reduced to two-thirds from the six-inch scale, and includes the greater part of Ben Armine and its immediate surroundings. The three principal summits of Ben Armine surmount a ridge extending over six miles in a north-north-west direction, and lying approximately twenty miles distant from the north coast, twenty-four miles from the east coast, and thirty-two miles from the west coast of Sutherland. Ben Armine is only separated from Ben Clibrick by the long, narrow, and steep-sided hollow which holds the beautiful lake known as Loch a Choire. This hollow is open to the north-east, but the high ground of the two mountains is connected by a narrow crest bounding the south-west end of the loch, and on its west side overlooking the point on the Tongue road known as the Crask.

Clibrick is 3184 feet in height, almost 1000 feet higher than Ben Armine, and the mass formed by these mountains is isolated on the Sutherland plateau. The nearest mountains have the same abrupt outstanding isolated character. The Morven group (Morven, 2313 feet) lies sixteen miles to the east: the two Ben Griams (1936 feet and 1903 feet) ten miles to the north-east: Ben Loyal (2504 feet) twelve miles to the north-west: Ben Hope (3040 feet) fourteen miles to the north-west:

and Ben Hee (2864 feet) sixteen miles to the west. All these mountains were mainly carved out during a past cycle of erosion, and have little relation to the headwaters of the present drainage system. They are (relict) types of mountains, known to geologists as monadnocks or mountains of circumdenudation. The string of mountains further to the west, between Ben Hee and the west coast, is fully twenty-four miles distant from Ben Armine. It intercepts some of the moisture brought by the Atlantic winds.

The following data are taken from Bartholomew's Meteorological Atlas: The annual rainfall is over 40 inches, *i.e.* more than on the Caithness high plateau. The wettest month is October, and the driest May. The monthly rainfall averages are: more than 4 inches from October to January; more than 3 inches during February and March; more than 2 inches from April to June; and more than 3 inches from July to September. The mean annual sunshine is less than 25 hours per month. The annual range of temperature is about 18°. The mean annual temperature varies from 40° on the higher ground to 47° on the lower part of the plateau.

The following table is constructed from the monthly isotherms for the plateau region :—

January,	37°	July,	56°
February,	38°	August,	56°
March,	39°	September,	53°
April,	44°	October,	47°
May,	49°	November,	41°
June,	53°	December,	39°.

The rocks of the Ben Armine country are chiefly mica-schists with some hornblendic, felspathic and siliceous schists, but all are so impregnated with material of a granitic nature as to form coarsely granitoid gneisses having certain resemblances to the Lewisian Gneiss of the North-West Highlands.[1] These hard, massive, crystalline rocks have imposing joint planes and form great cliff-faces and immense blocks and boulders, but under the prolonged influence of frost, have weathered, on the mountain-tops, into a debris of stones, grit, and sand.

A glacial drift swathes the gentler slopes and the hollows of the plateau. It is of a loose, gravelly, and sandy nature, full of blocks and fragments of the country rocks, but is rarely exposed, except in burn sections, since a great mantle of peat is spread far and wide on the face of the county. The whole of the great Sutherland plateau is enveloped in this peat, which stretches as far as the eye can see into Caithness and Ross, and reaches to the cliffs of the north coast. The contrast afforded by this great stretch of peat and the widely spaced features of the mountains, as seen from one of the heights on a clear day, forms an impressive picture pregnant of the reality and immensity of the great time changes.

The higher slopes of Clibrick rise above this peaty mantle, but peat covers the whole of the plateau, rises to the slopes and ridge of

[1] See *Summaries of Progress of Geological Survey*, 1910-1911, pp. 41 and 37.

Ben Armine, and is absent only on small areas of the summits, or other places where the physiography and exposure to wind, or other geological agents of denudation, have prevented its growth or have been inconsistent with its preservation.

The Ben Armine ridge is divided by saddles, or cols, into a series of gently rounded, plateau-like summits, three of which, Creag Mhor, Creag a Choire Ghlais, and an unnamed top at the northern end of the mountain, exceed the 2300-feet contour. There is a fourth small top called Creag Bheag, 1750 feet, at the southern end of the ridge. The plateau on which the mountain rests averages 800 feet in height, but has small elevations reaching the 1000-feet contour. The lowest col on the ridge does not descend to 1500 feet.

At its northern end the summit is broad, flat, and peat covered, but small areas forming the summits of Creag a Choire Ghlais, Creag Mhor and Creag Bheag are free of peat, though surrounded by it on all sides except where they directly overlie abrupt crags on the eastern face of the mountain.

Ben Armine has a very different aspect as seen from the west or the east. The western slopes rise gradually to the summits, and are completely peat-covered. The eastern face, on the other hand, is for the most part abrupt, and is marked by a series of five corries, three of which, the Coire a Saidhe Duibhe, and the two corries whose crags give their names to Creag Mhor and Creag Bheag, are backed by precipitous cliffs: whilst a fourth, the Coire Ghlais, is a "hanging-corrie" with very steep, rocky slopes. The fifth corrie, the Coire nan Eas, is wide, low, and open, backed by small scattered crags, breaking the lowest col in the centre of the ridge, where peat passes almost uninterruptedly from the western to the eastern slopes of the mountain.

The Ben Armine country is drained by a branch of the Brora River, the Black Water, whose tributaries take their rise to the east and west of Ben Armine, and flow in a south-east direction to join at a considerable distance beyond the confines of the map.

By far the greater part of the water from Ben Armine is derived from the peat, and flows away to the west. The streams descending the eastern flank (excepting the two traversing the Coire a Saidhe Duibhe and the Coire nan Eas, which have their origin in hollows lying to the west of the ridge) have no permanence and little volume, and the headwaters on this side of the mountain arise, for the most part, in the peat of the plateau.

The amount and direction of the drainage of Ben Armine is thus correlated with the physiography, the orientation of the mountain mass, and the distribution of peat. The westerly flowing drainage is held up by the peat, and is, comparatively speaking, somewhat sluggish and peaty in character: while that rising on the eastern flank is practically ephemeral and almost negligible in volume, but torrential in character, except where it issues as small springs from beneath the rock debris or peat near the tops of the corries. Much of the drainage of the eastern face, however, is also peaty in nature, since very little of the mountain mass rises above the great peat mantle. In the early part of the year

some is derived from the melting of snow lying in the higher parts of the corries.

Apart from the numerous peat holes, or Dubh-lochans, there are only two lochs in the area, Gorm Loch Mhor and Gorm Loch Bheag, both of glacial origin. They lie close under the eastern face of the mountain, are deep in relation to their superficial area, and have rock or moraine-dammed banks. The small amount of drainage entering the lochs is derived from the adjacent corries, and the waters are clear, and show but slight fluctuation in level. The lochs, therefore, show little sign of silting up or lowering through erosion at the outlets, and very little effect from rise and fall of the waters or from sand-drift, but their shores are subject to wave influence. They are, in fact, typical mountain tarns.

Apart from those leaving these lochs, the smaller streams all arise in the peat, their channels, in many cases, being mere peat-walled gullies or pipe-like drains beneath the peat. The numerous narrow alluvial tracts flanking the streams are formed from undercut peat surfaces let down within the flood zone, or consist of sand and gravel resulting from erosion of the sandy drift.

Ben Armine differs remarkably from the Ben Griams further east, and also from Morven, Scaraben, and the other mountains of Caithness, both in the greater altitude up to which numerous springs are found and in the development of corries having precipitous sides (these two features being, no doubt, correlated). The corrie development, however, is chiefly a result of the persistence of localised ice erosion during the later phases of glaciation. The steep corries on the eastern face of Ben Armine are fronted by semicircular groups of terminal moraines of the corrie-glacier phase, the moraines still standing out as sharply as if the glaciation were but a recent phenomenon. The only precipitous corrie in the other mountains mentioned above is the one on the north side of Ben Griam Bheag, and this also is accompanied by well-marked terminal moraines of the corrie-glacier phase.

Though Ben Armine receives a greater rainfall than the other mountains, there is little doubt that the frequency of occurrence and distribution of springs is less to be attributed to this than to differences in the shape of the mountains, and in the nature of the disintegration undergone by the rocks. The pyramidal masses of Morven and the Ben Griams are of small bulk relative to their height, and the conglomerates and sandstones of which they are chiefly composed break up to form gravels or screes of large blocks, into which water percolates to a considerable depth. In these respects Morven is a more extreme case than the Ben Griams, and the plant associations are of a correspondingly more xerophytic type. The similar relations existing between the quartzite of Scaraben and the great depth of porous angular debris in which the mountain is completely buried have been discussed in *The Vegetation of Caithness*.[1]

[1] C. B. Crampton—*The Vegetation of Caithness, considered in relation to the Geology*, 1911.

The massive, felspathic gneisses forming the bulk of Ben Armine show somewhat different relations in regard to weathering and the retention of water near the surface. The debris on the summits is less porous, and the results of decomposition are more evident than in the other cases. Considered in relation to its height, the plateau-like mass of Ben Armine further increases the water-holding powers of the mountain-top debris. The base of the mountain-top debris is rarely exposed on Morven, Scaraben, and the Griams, but is deeply undercut by the steep corries on the eastern face of Ben Armine, and the water which accumulates in the debris appears as springs on the rocky walls of the corries. But of more importance still is the cloak of peat, the inherited time effect of all these factors, combined with the wetter climate resulting from the geographical position of Ben Armine and its close association with Ben Clibrick. This cloak of peat holds up the water like a sponge, and supplies it to all the lower slopes and crags as small ephemeral streams, or oozing trickling springs, bathing the cracks and surfaces of the corrie walls.

This effect increases with the dominance of peat on the summit of the ridge as we pass from south to north along the corries on the eastern face of Ben Armine, the complete peat covering at the northern end of the ridge affording a more constant and larger supply of water to the corrie walls, with a corresponding difference in the type and development of the vegetation.

The peat covering the plateau and the gentler slopes averages five feet, but is often much thicker. On most of the slopes it is gradually shrinking, cracking, and slipping down hill, and this has led to undermining of the peat by water channels, and the formation of sinks and "swallow holes." Further stages in erosion produce a network of steep-sided gullies and peat hags.

The feeders of the streams run for considerable distances underground, in tunnels in the loose sandy drift beneath the peat, and the roofs of these tunnels gradually collapse to form rows of sinks, and eventually open channels flanked by high banks of peat.

Even the permanent water-courses, apart from those of the true valley streams, show, by their close relations to deeply cut sections in the peat, that they are only a further stage of evolution in the same process. They occupy ground which was formerly peat-covered, and have been originally derived from underground channels beneath the peat.

Everything points, indeed, to comparatively recent conditions when the whole district was completely clad in unbroken peat, which enveloped the slopes and even the summit of Ben Armine, filled all the hollows, covered the wider ledges on the crags, and occupied the positions of all the existing smaller water-courses. The drainage was held up by the spongy nature of a luxuriant moorland vegetation, continually soaked and subject to no such spells of drought as characterise the present climate. Growth of peat was at a maximum, and erosion limited to those streams that could keep open channels in spite of the rapid growth of moorland vegetation. The alternating layers of buried

forests and moorland peat encountered in all the sections, except in the most wind-swept places on the summit ridges, show that the phase of moorland plant activity was but a later one amongst others alternating with phases when the climatic conditions were different.[1]

The layers in the peat are the same as those described for the Caithness peat mosses.[2] At the base of the peat a "sub-arctic layer" similar to those discovered by Dr. Lewis, so widely spread in our Scottish peat mosses, has been noticed at a number of places in this area, and where it is wanting the base of the peat generally consists of layers of birch twigs and bark.

Higher up in the peat a layer of pine stumps is commonly met with throughout the district. The peat sections further show that since the death and decay of the pine forest a prolonged moorland phase has intervened. Though the great size of the stumps, and their widespread dominance, points to the trees having existed under fairly favourable conditions of drainage, it is quite evident that the succeeding moorland phase completely effaced such conditions, the growth of peat having been so rapid as to hold up the drainage and obliterate the smaller branches of the streams.

The plateau at that time must have exhibited a practically unbroken and soaking spongy mantle, dissected only by the larger stream courses. The slopes likewise were cloaked in wet peat whose surface drainage percolated slowly, without producing erosion, into the valley streams. The summits now bare of peat had then a thick humus covering, and even the most abrupt crags, where alone the peat could find no resting-place must have been continuously bathed in humous waters dripping from peaty accumulations on the ledges.

This we conceive as a picture of the last moorland phase, but the present conditions show that a great change supervened, such as can only be satisfactorily accounted for by a falling off in the amount and constancy of the precipitation.

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[1] Professor James Geikie suggested as long ago as 1867 that the buried forests in our peat mosses indicated changes of climate ("On the Buried Forests and Peat Mosses of Scotland, and the Changes of Climate which they Indicate."—*Trans. Roy. Soc. Edin.*, xxiv., 1867). This view has been supported by Blytt in Norway, and Sernander and the Uppsala School in Sweden. It is, however, rejected by a number of investigators of peat bogs in Norway, Sweden, and Denmark (see Gunnar Andersson, *The Climate of Sweden in the Late Quaternary Period*, 1909).

Dr. Francis Lewis's recent work on the Peat Mosses of Scotland has established the presence of a layer of subarctic plants intercalated in the peat between the forest beds in certain districts, and this has afforded additional support for Professor Geikie's view. As far as Central Sutherland and Caithness are concerned no subarctic bed has yet been detected except at the base of the peat deposits. This is believed by Dr. Lewis to correspond with his second subarctic layer overlying the lower forest bed in Shetland, and in the Southern Uplands of Scotland. See the following papers by Dr. Lewis:—"The Plant Remains in the Scottish Peat Mosses," Pts. 1-4—*Transactions of the Royal Society of Edinburgh*, 1905-1911; "The History of the Scottish Peat Mosses and their relation to the Glacial Period."—*Scottish Geographical Magazine*, vol. xxii., 1906; "The Sequence of Plant Remains in the British Peat Mosses."—*Science Progress*, No. 6, October 1907.

[2] C. B. Crampton.—*The Vegetation of Caithness, considered in relation to the Geology*, 1911.

The summits are now bare of peat wherever the physiography has favoured rapid drainage and erosion by wind. All stages in the denudation of the tops can be observed. Some still retain a thick peat covering, while on others the peat is gradually undergoing removal. The peat on such summits and on exposed cols has shrunk, and forms a network of gullies and peat hags. The slopes and peat-filled hollows are dotted with sink holes and areas of subsidence due to undermining and slipping of the peat. The stream courses are gradually stealing up the slopes, and are invading the hollows which formerly had an unbroken peat covering. Crags are reappearing from beneath the peaty mantle, and the thick peat of the plateau is shrinking, cracking, and gradually gravitating in the direction of the newly formed water-courses.

Marking the centres of the areas now defined by the water-courses, Dubh-lochans have appeared as a result of the disturbance of the surface and the drainage. Two types of Dubh-lochans are represented, as in Caithness: (*a*) Those scattered in floating peat, (*b*) those associated with sinks and underground drainage channels.[1] Many of the latter type have unfortunately been drained, and now form wide areas of black exposed peat.

From the ecological standpoint this great peat covering must be looked upon as an inheritance of the present vegetation. In spite of its degradation and partial removal the thick peat still dominates the surface, and acts as a barrier to all plants that cannot grow on an acid humus soil.[1] The effects of the dynamic agents of retrogression are, moreover, somewhat diverse in their operations. In the one direction they tend to exacerbate the barren condition, and to strengthen the barrier against immigration and competition by plants other than moorland species. By the erosion of thick peat and the baring of its surface, by stagnancy resulting from inequalities of the drainage, and by the liberation at the surface of vast quantities of previously stored and buried toxic humous compounds,[2] conditions are set up which are even intolerable to some of the moorland species prevalent under wetter climatic conditions. Toxic, humous conditions are superadded to periodical physical drought, and to a greater degree of stagnancy than can have ever prevailed during the wetter climate of the preceding moorland phase, when the plant covering of the peat was unbroken and continuously bathed by fresh precipitation.

On the other hand, by erosion leading to exposure of rock and drift, which in the Ben Armine district sometimes contain a higher percentage of lime than is usual in our highland schists and gneisses, by a periodical flushing and drying of slopes and alluvial surfaces, an amelioration of the barren conditions has been locally brought about. Plants, which during the previous moorland phase were doubtless restricted to the stream alluvia of the lower country where peaty waters were less in evidence, have advanced far into the moorland region, and have taken possession of such alluvial surfaces, rainwashed slopes, and exposed surfaces of

[1] See *The Vegetation of Caithness*.

[2] B. E. Livingston.—"The Physiological Properties of Bog Water."—*Botanical Gazette*, 39, 1904.

rock and drift as are not still subjected to the most peaty type of drainage.

Further, an alpine flora of a meagre kind has reinvaded those crags and summits from which the peat has been removed. Some of the alpine species doubtless found refuge throughout the late moorland phase on the cliffs of the corries, but the species having the present majority of individuals are such as can flourish on peat surfaces when they are unbroken and subject to frequent precipitation. These belong to a group which everywhere is most evident on the alpine boundary of the moorland, and is capable of living either on leached alpine rocks and debris, or on peat, provided the competition is not adverse to them, and the surface is not too toxic with humous compounds.

Apart from critical forms it is probable that we have no endemic species in our limited alpine flora. Most of our alpine species, in fact, have a very wide range on the mountains of Europe and Asia, and many are circumpolar in distribution on the tundras, or are also found on some of the North American mountains; they are therefore often classed as arctic-alpines. The group of alpines referred to above,[1] however, appears to be separable from the rest of our alpines by its powers of withstanding the competition and edaphic conditions accompanying the rapid accumulation of moorland peat, since its species are not only commonly met with at the present time on thick peat, but must formerly have dominated wide areas of the plateau peat mosses during the climax conditions of the wettest moorland phases, and are represented in the history of the peat mosses by Dr. Lewis's subarctic layers.[2] [3]

The species referred to the "peat-alpines" are still, perhaps, more abundant in this area and the neighbouring districts of Sutherland than in any other part of Britain, while other alpine species are poorly represented. This numerical relation has doubtless resulted from the intensity and all-pervading nature of the moorland phases in these districts, the widely enveloping peat growth favouring the peat-dwelling arctic-alpines and leading to an elimination of the others.

In reference to these two types of alpine species the following notes are of importance. Ben Clibrick rises considerably above the peat mantle, and supports several species not found on Ben Armine, including *Sibbaldia procumbens* (Mountain Potentilla), *Cherleria sedoides* (Cyphel), *Luzula spicata* (Spiked Woodrush), and *Gnaphalium supinum* (Dwarf Cudweed).

The following are far more abundant on Clibrick than on Ben

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[1] Other arctic-alpine species have only been found as yet in the basal deposits of the peat.

[2] C. B. Crampton.—*The Vegetation of Caithness, considered in relation to the Geology*, 1911.

[3] F. Lewis.—"The Plant Remains in the Scottish Peat Mosses," Pts. 1-4.—*Transactions of the Royal Society of Edinburgh*, 1905-1911.

—— "The History of the Scottish Peat Mosses and their relation to the Glacial Period."—*Scottish Geographical Magazine*, vol. xxii., May 1906.

—— "The Sequence of Plant Remains in the British Peat Mosses."—*Science Progress*, No. 6, October 1907.

Armine: *Polygonum viviparum*, *Juncus trifidus*, *Silene acaulis* (Moss Campion), *Saxifraga oppositifolia*, and *Antennaria dioica* (Mountain Everlasting). The following are confined to crags on both mountains: *Saussurea alpina*, *Hieracium* sp. (Hawkweeds), *Oxyria digyna*, *Cystopteris fragilis* (Bladderfern), *Sedum Rhodiola* (Roseroot), *Salix lapponum*, *Asplenium viride*, *Polypodium Dryopteris* (Oakfern), *P. Phegopteris* (Beechfern).

Others are confined to alpine springs or wet cracks, as—*Epilobium alpinum*, *Saxifraga stellaris*, *S. aizoides*. Others again are chiefly in the alpine grassland, nursed by flushes, as—*Alchemilla alpina*, *Thalictrum alpinum* (Alpine Meadow rue), *Festuca vivipara*, *Aira cæspitosa*, var. *brevifolia*.

Certain species border on the "peat-alpines," as—*Azalea procumbens*, *Salix herbacea*, and *Carex rigida*, and specially characterise the smooth parts of the mountain-top formerly covered by peat, and now chiefly occupied by *Calluna* (Heather) mat, or *Rhacomitrium* carpet. They invade smooth, peat-covered surfaces greatly influenced by wind exposure.

The true "peat-alpines"—*Arctostaphylos alpina*, *A. Uva-ursi* (Bearberry), *Rubus Chamæmorus* (Cloudberry), *Salix repens* and allied creeping species, *Betula nana* (Dwarf Birch), *Lycopodium Selago*, *L. alpinum*, *Empetrum nigrum* (Crowberry), *Vaccinium Vitis-idæa* (Cowberry), are locally replaced or joined by others more susceptible to wind exposure and the chilling action of a constantly saturated surface, and usually found on well-drained and aerated peat. Such are—*Vaccinium Myrtillus* (Blaeberry), *V. uliginosum*, *Melampyrum montanum*, *Cornus suecica* (Dwarf Cornel). These, however, are chiefly found on well-drained, sheltered peat surfaces on the higher slopes and ledges of the corries, where they are sometimes found attempting to dispute the ground with the ubiquitous *Calluna* (Heather), but usually only in places where this is straggling, and would probably under quite natural conditions have been succeeded by scrub birch and Rowan, or a shrubby growth of *Betula nana*, *Vaccinium*, and *Salix*. They are, therefore, in all probability, to be classed as species locally dependent on an alpine dwarf scrub on a peat substratum, and are sometimes accompanied by one or other of the following: *Blechnum Spicant* (Hardfern), *Pyrola secunda*, *P. minor*, *Listera cordata*, *Lastræa montana*, *Trientalis europea*.

As a comparison with the nearest mountains it may be added that *Dryas octopetala* and *Carex capillaris* occur on Ben Griam Mhor, *Statice maritima* and *Gnaphalium supinum* on Ben Loyal, but none of these are found on Ben Armine.

It is therefore noteworthy that a number of alpine species of the Central Highland mountains are wanting on Ben Armine, and that Ben Clibrick and the nearest mountains only add seven species to the Ben Armine list, whilst at the same time the "peat-alpines" are abundant and vigorous in Central Sutherland, and on Ben Armine in particular. It appears from this that the greater altitude and more precipitous orography of the Central Highlands afforded better sanctuaries for the more characteristic arctic-alpine species during past periods of great

peat growth, which caused an invasion and narrowing of their domain, but favoured the spread of "peat-alpines."

It may be further remarked that an exposed, highly glaciated, plateau and roches moutonnées topography, such as that of Central Sutherland and Western Caithness, is peculiarly favourable to a peat-moss or to a peat-alpine and tundra vegetation, according to the severity of the climate, while the steep-walled cirques, arêtes and over-steepened valley sides of a glaciated mountain complex like that of the Central and Western Highlands, provide conditions of soil, drainage and protection from wind, better suited for the more delicate alpine species and sub-alpine woodlands.

When the peat swept over the summit of Ben Armine, Clibrick still stood out as an isolated alpine sanctuary, and the Central Highland mountains afforded larger and more continuous areas of precipitous mountain crag and steep debris-clad slopes, where the alpine plants were isolated in cold and humid surroundings. During the drier continental phases the alpine plants would find the summer and winter conditions more favourable for them, provided they were sufficiently rigorous to limit incursions by the subalpine forest. Owing to their isolated geographical position, our arctic-alpines were evidently recruited with difficulty from other alpine or arctic centres. The species which are continental-alpine, as differentiated from arctic-alpine, are very few in Britain, and perhaps were never well represented in our alpine flora.

We have already indicated the present dominance of moorland plant associations, and their probable greater extension at a former time. Limits were, however, always set by the migratory agents of geological change, wind, gravity, and running water, and it is in places most affected by these agents that the greatest retreat of the moorland associations is found at the present time.[1]

The migratory plant associations take possession of these places, compete for them with the stable moorland associations, and gain ground at their expense, or are forced to retreat before them, according to (*a*) the phases of retreat or advance of the moorland climatic province, or (*b*) the advance or retreat of the zones of activity of the migratory agents of surface change.

The plant associations may therefore be classed into two groups as follows:[2]—

(I.) Stable associations chiefly owing their inheritance to the rigorous conditions imposed by the late glaciation and the post-glacial climate, and, apart from man's interference, attaining to the full stabilisation allowed by this inheritance under the present conditions of climate and physiography.

(II.) Migratory associations chiefly owing their present distribution to the migratory agents of surface change. The limits and nature of their

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[1] C. B. Crampton.—*The Vegetation of Caithness, considered in relation to the Geology*, 1911.

[2] C. B. Crampton.—"The Geological Relations of Stable and Migratory Plant Formations."—*Scottish Botanical Review*, vol. i., pts. 1, 2, 3, Jan.-July 1912.

stabilisation accord with the changes produced by these agents and the effects of animal interference.

(I.) *The Stable Associations* are of three main kinds :—

(*A*) Associations occupying places where topographic factors still preserve habitats approaching those which must have been widespread and dominant during the late climax moorland phase. Such factors provide habitats for (1) the "alpine peat mosses," where an unbroken cloak of wet peat still covers the gentle slopes of the mountain summits, in positions subject to the maximum of present atmospheric moisture : (2) "Sphagnum mosses" in circumscribed areas of the plateau, where the surface of the peat is floating and still retains plant associations in which *Sphagnum* takes a controlling part.

(*B*) Plant associations occupying areas of peat where it has undergone shrinkage, slipping, undermining, and disturbance of the surface, leading either to drainage or bogginess. This has naturally brought about a redistribution of species in reference to their dominance, allowing certain species like *Calluna* (Heather), which must formerly have only covered well-drained areas, and *Rhacomitrium*, which specially affected wind-swept places, to invade the moorland far and wide, and to form new associations characteristic of the various retrogressive conditions now widespread and dominant. Under these conditions we have :—

(1) Retrogressive types with good drainage.
  (i) *Calluna* moor (Heather moor).
  (ii) Alpine *Calluna* moor.

(2) Retrogressive types with bad drainage.
  (i) *Rhacomitrium* bogs.
  (ii) *Scirpus-Eriophorum* bogs (Deer's Hair and Cottongrass bogs).

(*C*) Progressive plant associations, colonising steep banks and alluvial terraces, etc., which have been deserted by the geological agents of surface change. Amongst these we have :—

(1) Grass heaths, the degenerate representatives of associations passing into birch scrub by the process of succession. Such associations had former periods of dominance when the birch scrub occupied wider areas of the plateau, but at the present time they only assert themselves under the limited topographic conditions resulting from late erosion, and are but poorly represented in the Ben Armine district. Under a wetter climate they would probably succeed *Calluna* moor over limited areas.

(2) Sphagneta and grass moors, on more recent growths of peat, on deserted stream terraces, and elsewhere, under conditions where slipping and breaking of the peat are not entailed. There are indications in the plant succession of the moorland that the dry phase, which succeeded the last great moorland phase, and led to the widespread retrogression of our moorland associations, has probably been on the wane for some time past, and that some of these progressive types of moorland associations are beginning to reassert their claims, under climatic conditions more favourable to their growth.

These three types : (*a*) the climax, (*b*) the retrogressive, (*c*) the progressive, might be looked upon as three plant formations, regionally successive to one another, but existing side by side at the present time

owing to topographic factors: or they might be classed as three sub-formations of a moorland formation, each in turn becoming dominant during (*a*) climax phases, (*b*) retrogressive phases, (*c*) progressive phases. The sphagneta, grass heaths, grass moors and birch scrub, characterise the initial and progressive stages (*c*); the alpine peat mosses, the climax phases (*a*); and the present dominant bogs and *Calluna* moor (together with the pine forests, unfortunately extinct so far as this area is concerned) the retrogressive phases (*b*).

But topographic differences may supply the needs of the various associations during stages other than those in which they are dominant, and thus we may find them all co-existing at the same time, where the surface is sufficiently diversified to afford places of refuge for those that are recessive. Such sanctuaries form centres of dispersal when the climatic conditions again become favourable for one or the other type that may be, for the time being, recessive.

In sections of peat mosses we may therefore expect layers pointing to such progressive, climax and retrogressive stages, marking both secular changes (regional successions), and the effects induced by the migratory geological agents of surface change (topographic successions).[1]

Before assuming climatic change it is necessary to weigh carefully the evidence as to the cause of the succession, and if climatic change is inferred, the evidence as to whether changes in temperature or differences in the amount and distribution of the atmospheric precipitations are chiefly responsible. It is probable that a climate favouring the spread of peat mosses tends to limit the distribution of many arctic-alpine species, though it may favour those referred to as "peat-alpines," whereas one leading to their retrogression, in the absence of higher temperatures, may have the reverse effect.

In regard to the former distribution of species in the moorland region, the barrier to plant migration resulting from the gradually accumulated peat deposits probably merits greater attention than has been given to it. In discussions on the former more northerly or southerly limits to the distribution of various tree species in north-west Europe the summer temperatures have been considered the determinating factor, but plants like the Hazel, that only grow on thick peat under exceptional conditions,[2] might well be gradually eliminated from areas where they formerly grew, by the increasing depth of moorland peat, whilst others like the pine might become more and more restricted to such areas by competition with other trees.

In this connection it is noteworthy that the buried forests in this country rarely contain Hazel except they be basal in position, while the pine stools are almost invariably found overlying thick peat.

Both buried forests and subarctic layers need, therefore, separate consideration as regards their basal position or their intercalation in

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[1] C. B. Crampton.—"The Geological Relations of Stable and Migratory Plant Formations."—*Scottish Botanical Review*, vol. i., pts. 1, 2, 3, Jan.-July 1912.

[2] *E.g.* where the soil waters are alkaline.

thick peat. A number of forest or arctic-alpine species, according to the climate, may well have had a wide range before the thick peat accumulated, but their later migrations in the moorland region would become more and more restricted except in the case of those species like the Pine, Birch and the "peat-alpines" which could tolerate the competition and edaphic conditions encountered in the vegetation on thick peat accumulations.

(II.) *The Migratory Associations.*—The plant associations of migratory formations are chiefly found in relation to the stream belt and in the rock-bound corries and on the mountain tops. Thus we have—

(*A*) Plant associations limited to parts of the stream belt where the agents of geological change involve flushing of the surface of the peat, erosion of peat or drift, and the formation of rainwash or alluvial deposits. These form habitats which encourage the growth of plants debarred from the more stable areas of peat surfaces. The plants composing the associations may be—

(i) Species naturally associated with moorland vegetation and rarely found save in its vicinity. These include in particular those of moorland springs and wet moorland flushes, where certain bryophytes and so-called "bog-plants" have their centres of distribution.

(ii) Species with centres of distribution beyond the moorland districts, but encouraged to invade them through the conditions afforded by the migratory agents. These include grasses, marsh or other plants from the lower alluvial stretches, and bushland species following the stream alluvia and steep banks of the water courses.

(iii) Species from the alpine region also invade the moorland stream courses.

The alpine migrations appear to be mainly the result of plants or seeds carried down stream, while the lowland migrants seem to be chiefly transported by animals. Thus moorland, lowland, and alpine species contest the ground, and are found as pure associations, or forming various combinations, stabilised to the extent and in the direction allowed by the migratory agents, as represented by geological changes and those induced by herbivorous mammals.

The plant associations may be grouped as follows :—

1. Those of springs with alpine species.
2. Those of springs and wet flushes with moorland species.
3. Those of flushes with moorland and lowland species.
4. Grasslands of dry flushes with alpine species (alpine grasslands).
5. Grasslands of moorland alluvia with moorland species dominant.
6. Grasslands of sandy river alluvia with lowland immigrants.
7. Open associations of sandy and gravelly alluvia with alpines.

(*B*) Plant associations that are normal to rock surfaces as found in the rocky stream channel, gorges and waterfalls, and on the steep crags which back the corries. A study of such rock formations shows that several factors have to be taken into consideration, namely—

1. The age of the plant succession.

2. The history of the rock surface exposed.
3. Its physiographic and edaphic relations as a station for plant growth.

Many of the rock surfaces at present exposed to plant colonisation have been but recently, or are even now, undergoing denudation from a peaty covering, or are so situated in reference to the thick peat mantle as to be dominated by a peaty drainage. Whole cliff faces may in this manner be subject to drip from overlying thick peat and show plant associations which, though differing from normal moorland associations, yet have a large share in their ecological inheritance.

Some owe their exposure to late glacial conditions and are so situated physiographically that their features have little relation to the present migratory conditions of geological change. Many of these were recently covered with thick peat or are still partly covered by it and undergoing denudation, and their conditions are the same as those which have been noticed above. Others are more or less horizontal surfaces or large glacial boulders denuded of peat, and yet only subject to the slow processes of disintegration by frost under conditions which may be termed alpine or subalpine, as the case may be. These are slowly acquiring a vegetation in which the degree of stabilisation is only limited by the barren and slowly decaying nature of the substratum. These usually pass into those noted in the next section, where the extent of stabilisation is controlled by migratory factors of exposure to wind and surface creep.

In contrast with the above are those rock surfaces where the degree and kind of stabilisation is limited by certain presently acting geological factors, such as—

1. Instability of position due to physiography. The ledges, crevices and rock faces of the corrie walls have but a limited existence as a substratum for plant growth. The plants of such stations may be separated into lithophytes or rock-surface plants, chasmophytes or crevice dwellers, and ledge chomophytes or dwellers on soil accumulations on ledges.[1] [2] [3]

2. The flushing of rock surfaces by springs, which may be comparatively permanent or markedly periodic and migratory in their influence, deserting one part of the rock surface for another as time progresses. The habitats induced by such conditions may be separated as "rock flushes."[4]

3. Exposure of rock surfaces to the permanent or periodic flooding of streams, in waterfalls or on the floors and walls of rock chasms and gorges, or on boulders large enough to be stationary for long periods. These constitute the "rocky stream channel."

The rock plants are therefore a very varied assemblage and live under very varied conditions. Those of the rocky stream channel are aquatic or amphibious lithophytes, algae and bryophytes, capable of withstanding a considerable force of water and scour without being dislodged. They

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[1] A. F. W. Schimper.—*Plant Geography on a Physiological Basis*, p. 178.

[2] M. E. Oettli.—*Beiträge z. Ökologie der Felsflora*, Zurich, 1905.

[3] Members of the Central Committee for the Survey and Study of British Vegetation.—*Types of British Vegetation*, 1911.

[4] C. B. Crampton.—"The Geological Relations of Stable and Migratory Plant Formations."—*Scottish Botanical Review*, vol. i., pts. 1, 2, 3, Jan.-July 1912.

are strongly attached to the rock and float freely with the water currents, or lie prostrate with a special curvature, orientation and imbrication of the leaves and branches, protective against scour and dislocation.

Those of the rock flushes are amphibious and more often intricately matted and soil-accumulating, but sometimes show similar devices against erosion.

The subaerial lithophytes vary according to the orientation and nature of the rock face, and the degree of exposure to sun, wind and atmospheric precipitation. Crustaceous lichens preponderate and are accompanied by densely cushioned mosses, often hoary and drought-resisting. The frequently loosely attached, foliaceous and fruticose lichens affect less inclined surfaces with a tendency to soil accumulation. The strongly attached, umbilicate *Gyrophoraceæ*, on the other hand, chiefly affect horizontal wind-swept and grit-scoured rock surfaces, which suggests that their habit may be of service to them against sand blast.

The chasmophytes are the most characteristic of the phanerogamic rock vegetation, since the isolation they procure from the nature of their habitat limits competition. The most characteristically alpine species are therefore usually chasmophytes, or are found on the narrowest rock ledges where the moorland plants fail to obtain a footing.

(*C*) Plant associations that take possession of—

1. The rock debris of the flatter summits of the mountains.
2. Exposed smooth crests of gravelly morainic accumulations.
3. The more or less horizontal broken rock surfaces of roches moutonnées on the plateau, where denuded of peat and exposed to frost and wind.

The rock debris covering the high mountain plateau is believed to have resulted from the combined action of frost and wind since late glacial times. The material is subject to creep away from the crests of the mountain ridges, and its surface is usually highly porous owing to deflation by wind. Many of the small roches moutonnées at much lower elevations on the Sutherland plateau (800-1000 feet) have been long subjected to the action of frost and wind, and are covered by a mantle of debris of a similar character. The whale-backed surfaces of moraines in this region also often consist of wind-deflated debris of small stones.

These habitats differ somewhat in altitude and the nature of the surface, but have in common the smooth, rounded contours originally due to glaciation, and the relatively elevated and whale-backed shape, porosity of surface, and exposure, which results in rapid drainage and wind deflation.

These influences have led to their escape or early emergence from the peat mantle that lately covered every surface compatible with its formation. These debris-strewn surfaces and the alpine peat mosses are the special habitats in Sutherland of that group of arctic-alpine species already referred to as capable of growing on thick peat. *Arctostaphylos alpina*, *A. Uva-ursi*, *Betula nana*, and *Vaccinium Vitis-idæa*, appear to be equally at home on either type of surface, while *Azalea procumbens* rather avoids the peat and is almost peculiar to the habitats under discussion.

The important point is that these surfaces form places of refuge for

certain alpines during stages of shrinking and retrogression of the peat mosses, and again centres of dispersal during the wettest stages or climax moorland phases.

Certain plants like *Azalea procumbens* are rarely found on them except at the higher elevations, presumably because during the moorland phases these positions withstood longest the encroachment of peat and were the earliest to emerge from it. Species like *Arctostaphylos alpina* have found in them a place of refuge during stages of moorland retrogression, while *Rubus Chamaemorus*, which always occurs on peat, will persist or become extinct according to the fate of the alpine peat mosses. The associations in possession of these surfaces therefore consist of plants capable of withstanding the inhospitable conditions of exposure they afford, and are either xerophytic alpines like *Azalea procumbens*, which can only compete with moorland species under very restricted conditions, species like *Arctostaphylos alpina*, which compete with moorland species under less restricted conditions, or moorland species like *Rhacomitrium lanuginosum*, or forms of moorland species like the mat type of *Calluna*, which were capable of adapting themselves to the altered conditions when peat was denuded from the surface.

II. The Moorland Plant Associations.

The moorland plant associations of this area for the most part closely resemble those of Caithness, and their general relations to the physiography are similar so far as the plateau is concerned.

They may be tabulated as follows :—

Stable moorland.	*A.* Climax types but recessive and relict.	1.	Alpine peat mosses.
		2.	*Sphagnum* aureoles.
	B. Retrogressive types.	3.	*Rhacomitrium* bogs.
	(*a*) Badly drained.	4.	*Scirpus-Eriophorum* bogs.
	(*b*) Well drained.	5.	*Calluna* moor.
		6.	Alpine *Calluna* moor.
	C. Initiative types, progressive but local.	7.	Grass heaths.
		8.	Alpine moss heaths.
		9.	Sphagneta.
Migratory types.	*D.* Moorland flushes, etc.	See Section on flushes.	

Badly drained foci with Dubh-lochans, *Sphagnum* aureoles and *Rhacomitrium* bogs, occupy central areas furthest removed from the stream courses, whilst zones of *Scirpus-Eriophorum* bogs and *Calluna* moor are met with in succession as we approach the better drained belts along the stream courses or the slopes of the hills. It is in the development of the alpine peat mosses that the Ben Armine district excels.

Reference to the map will show that the alpine peat mosses form a zone on the highest slopes encircling the associations of the mountain-top debris, and that the zone is best developed on the north-west side of the summits. This is partly due to the gentler slopes in this direction, but undoubtedly has also close relations to the greater exposure to wind

and atmospheric precipitation coming from this quarter. The surfaces of the alpine peat mosses are smooth and the underlying peat is unbroken. The plant association abruptly changes to others when slipping or undermining of the peat has taken place.

The plant association is as follows :—

Mosses and lichens forming the smooth carpet :—*Sphagna* ssp. chiefly acutifolia, *Hylocomium splendens*, *Hylocomium loreum*, *Hypnum Schreberi*, *Rhacomitrium lanuginosum* (patches), *Cladina sylvatica*, *Cetraria islandica* (Iceland Moss).

Tips of shoots showing :—*Vaccinium Vitis-idæa* (Cowberry) (common), *V. Myrtillus* (Blaeberry) (less often), *Erica Tetralix* (Crossleaved Heath) (frequent), *Calluna vulgaris* (Heather).

Espalier growth :—*Arctostaphylos alpina* (characteristic), *Arctostaphylos Uva-ursi* (Bearberry) (occasional), *Empetrum nigrum* (Crowberry) (common).

Juncus squarrosus (common), *Carex rigida* (local), *Rubus Chamæmorus* (Cloudberry) (characteristic), *Eriophorum vaginatum* (Cotton Grass) (scattered not tufted), *Eriophorum polystachion* (scarce), *Cornus suecica* (Dwarf Cornel) (local), *Salix repens* (Creeping Willow) (local), *Betula nana* (Dwarf Birch) (local), *Pinguicula vulgaris* (Butterwort) (frequent).

The most noticeable vegetative characters are the luxuriance and even surface of the moss carpet and the small development of the epigeal in comparison to the underground parts of the vascular plants. The underground stems of several of the species have a strong general resemblance in their more or less horizontal position and greatly elongated, tough wiry nature, and generally pale, yellowish colour with little development of cortex. The roots are few, whitish and relatively thick.

The shoots may form rosettes like *Juncus squarrosus* and *Carex rigida*, barely emergent leafy branches like the *Vaccinia* and *Erica*, or appear for short distances creeping on the surface like *Arctostaphylos* and *Empetrum*. None of the plants except *Eriophorum* usually bear flowers or fruit in abundance. The type of vegetative growth appears to be related to the combined effects of an abundant water supply in the moss and the frequent evaporation and chilling by strong winds.

The alpine peat mosses are generally abruptly limited above by the mountain-top debris. On the north and west flanks of the summits, where the alpine peat mosses usually give place above to the *Rhacomitrium* carpet association, the passage may be gradual owing to the *Rhacomitrium* being dominant in the alpine peat mosses near the boundary, but the latter seem to be always on peat, while the *Rhacomitrium* carpet lies directly on the rock debris and is of comparatively recent origin. The junction suggests that the alpine peat mosses are spreading locally and succeed the *Rhacomitrium* carpet association.

On the southern flanks the alpine peat mosses come more frequently into contact with the *Calluna* mat association, and here the junction suggests a retreat of the alpine peat mosses. (See section on the mountain-top debris).

The *Sphagnum* aureoles, *Rhacomitrium* bogs, *Scirpus-Eriophorum* bogs, and *Calluna* moor are practically identical plant associations with those of

Caithness, and there is at present little to add to the account of them given in *The Vegetation of Caithness.*

In this part of Sutherland intermediate stages between *Sphagnum* aureoles and *Rhacomitrium* bogs are more frequently met with, but it is not yet certain whether these mark degenerative stages of *Sphagnum* aureoles, or their recent advance at the expense of the *Rhacomitrium* bogs. *Vaccinium oxycoccus* and *Carex pauciflora* are generally present in the *Sphagnum* aureoles.

Other noticeable points are the absence of Bog Myrtle (*Myrica Gale*) in the bogs on the higher Sutherland plateau (800′), and the common occurrence of *Betula nana* even in those bogs which have undergone retrogression.

The Bog Myrtle is abundant in the lower-lying bogs north and south of this district (in the hollows of the Sutherland plateau and on the Caithness plain), and its distribution in Sutherland is suggestive of a comparatively recent advance from low levels. The persistence of *Betula nana* may point to the plateau bogs of Central Sutherland having entered into the late phase of retrogression at a later date than the other bogs in the north-east of Scotland, or of their having come more recently under conditions of artificial interference affecting the flora.

A parallel case is found in the *Calluna* moor of the Ben Armine district being chiefly of the type of *Calluna* moor with alpines. In comparison with other districts of the north of Scotland, *Calluna* moor is poorly developed on the Sutherland plateau and especially in the Ben Armine district. It forms only small areas on the steeper slopes, and narrowly fringes the streams on parts of the peat which have slipped and have become drained without undergoing erosion or flooding. It also commonly forms small patches round sinks in the peat.

On descending the stream courses to the points where the drift is undergoing erosion the peat alpines disappear, and the banks deserted by the streams show a plant succession progressive to *Calluna* grass-heath. This consists of bushy *Calluna* with *Hylocomium splendens*, *Hypnum Schreberi*, *H. cupressiforme* var. *ericetorum*, *Dicranum scoparium*, *D. majus*, *Aira flexuosa*, *Luzula pilosa*, *Galium saxatile*, *Potentilla sylvestris*, *Viola Riviniana*, *Blechnum Spicant*, and *Vaccinium Myrtillus*.

This association would probably advance to birch scrub under completely natural conditions. Rowan seedlings are fairly common, but those of birch very rare. Birch is abundant at Loch Choire, but appears to have been destroyed in the Ben Armine Forest.

The alpine *Calluna* moor has a more straggling growth of *Calluna* than *Calluna* moor, with a more luxuriant and wetter type of moss growth, often including patches of *Sphagnum* with abundant *Hylocomium loreum*, *Diplophyllum albicans*, *Polytrichum alpinum*, etc., and the alpines *Cornus suecica*, *Vaccinium Vitis-idæa*, *V. Myrtillus*, *V. uliginosum*, *Rubus Chamæmorus*, and sometimes *Betula nana*.

Calluna heath, or moor, and alpine *Calluna* moor may sometimes be seen on the opposing banks of the upper stream courses, where one is more subject to drought and exposure to the sun's heat, and the other damper and more shaded, showing that in the former case these

factors have much effect in encouraging the growth of *Calluna* and its associates and suppressing that of the alpines.

On the higher ledges of the corries and sheltered, steeper slopes of the mountain-top debris, the alpine *Calluna* moor gives place to an alpine *Vaccinium* heath. Here any peat that occurs is thin and of recent formation, and *Calluna* is almost absent, the association consisting of luxuriant masses of *Hylocomium* (chiefly *loreum*) with *Sphagnum*, numerous hepatics, *Dicranum sp.*, and abundant *Vaccinium Myrtillus*, *V. Vitis-idæa*, *V. uliginosum*, *Cornus suecica*, etc.

The progressive types of sphagneta are chiefly found round bog springs and in continuously wet moorland flushes, but also on deserted terraces of the stream alluvia when they have become subject to flushing by peaty ferruginous drainage from the adjacent bogs. An iron pan is then generally formed and the surface becomes stagnant. Under the former circumstances they depend on migratory factors for their appearance, and the species of *Sphagna* are generally cuspidata or subsecunda and have *Juncus effusus* and *Polytrichum commune* as associates.

On some of the terraces there has been a considerable formation of peat of apparently recent origin dominated by *Sphagna* (*cymbifolia* and *acutifolia*) with *Eriophorum*, *Erica Tetralix*, *Drosera* and other forms, and in these we have a progressive stable type of moorland association.

III. The Plant Associations of the Debris of the Mountain Plateaux.

The debris covering those parts of the mountain tops bare of peat consists chiefly of small subangular or more or less rounded fragments of the underlying granitoid gneisses. The surface is all stones, but much sand and fine grit is usually found a few inches below, since the gneiss decays and becomes disintegrated, and the action of the wind causes considerable attrition and rounding of the stones. Layers of humus also occur buried in the debris.

The plant associations are almost limited to small areas of the smooth, rounded, almost plateau-like summits of Creag a Choire Ghlais, Creag Mhor and Creag Bheag. These areas are shown on the map as occupied by two principal associations, (1) *Rhacomitrium* carpet,[1] [2] [3]; and (2) *Calluna* mat; but under certain circumstances to be mentioned below other associations may supervene. The nature and composition of these associations are as follows:—

In the *Rhacomitrium* carpet *Rhacomitrium lanuginosum* is dominant, forming a continuous smooth carpet varying from a few inches to a foot or more in thickness. All the other plants grow in this carpet, and are dependent on it for protection and moisture. The surface is greyish

[1] C. B. Crampton.—*The Vegetation of Caithness, considered in relation to Geology*, 1911.

[2] Members of the Central Committee for the Survey and Study of British Vegetation. *Types of British Vegetation*, 1911.

[3] Compare *Grimmia* Heath of Ostenfeld.—*The Land Vegetation of the Faroes.*

green and pale when dry, owing to the woolly nature of the leaf tips of the moss. The lower parts are shades of olive-green and yellowish brown, and the appearance of this colour on the surface denotes recent wind erosion. The other plants growing in the moss generally only expose the tips of their shoots, but the extent to which they compete with the *Rhacomitrium* for surface area depends on the degree of protection from the wind. *Aira flexuosa*, *Carex rigida*, and *Salix herbacea* are generally abundant even in the most exposed places. They creep in the moss layers and usually are only to be detected by emergent leaves. Elsewhere there is also a thin weaving of *Galium saxatile*, *Empetrum* forms mats, and *Vaccinium Vitis-idæa* and *V. Myrtillus* appear either as scattered single or bunched shoots from stems creeping beneath the moss. Lichens are scarce, but there is often a thin weaving of *Cetraria islandica*. Dwarf plants of *Solidago Virg-aurea* (Golden rod), 1 to 3 inches, are scattered. As one walks from the exposed summits of the more sheltered easterly slopes above the crags, the *Rhacomitrium* carpet passes through stages where the *Vaccinia* become more abundant, into an alpine *Vaccinium* moss-heath with *Hylocomium loreum*, *H. splendens*, *Polytrichum alpinum*, *Hypnum Schreberi* and patches of *Sphagna* (*acutifolia*), *Cladina*, *Dicranum uncinatum*, *Leptoscyphus Taylori*. These and other species gradually displace the *Rhacomitrium*. The *Vaccinia* become bushy in habit but dwarf, and are accompanied by *Cornus suecica*, *Rubus Chamæmorus* and *Vaccinium uliginosum*.

The *Rhacomitrium* carpet and the alpine *Vaccinium* moss-heath are progressive associations, but the former from its wind-exposed position is liable to be destroyed by the wind ripping it from the underlying debris, rolling it up and carrying it bodily away. The Alpine *Vaccinium* moss-heath is more stable, but from its protected position is more subject to snow lie, which sometimes leads to its destruction in places where peat has accumulated, by causing creep of the surface, the peat gradually slipping into the corries beneath. The central areas of these snow lies, whether on alpine *Vaccinium* moss-heath, or *Rhacomitrium* carpet, are always marked by a growth of *Nardus stricta* (Mat Grass).

On the northerly and westerly slopes the *Rhacomitrium* carpet may abut directly upon the alpine peat-mosses if the slope is gentle. In such cases the mosses appear to succeed the *Rhacomitrium* carpet by an invasion of *Sphagnum*, *Eriophorum*, *Juncus squarrosus*, *Arctostaphylos alpina*, etc. But for the most part the *Rhacomitrium* carpet passes into *Calluna* mat; and this is especially so on the southern and south-western aspects, where the exposure to wind and sun is greater in comparison with the atmospheric precipitation. As we pass outward from the *Rhacomitrium* carpet, the *Calluna* mat first appears as small patches in the carpet. These soon coalesce, until the *Rhacomitrium* only forms patches in the *Calluna* mat. In either case the patches are usually elongated, with a parallel orientation at right angles to the direction of the prevalent wind. The surfaces beyond, occupied only by *Calluna* mat, show a wave and trough-like arrangement of patches of *Calluna* mat and bare debris, which also have a similar orientation. The kind of passage at the junction of the two associations therefore suggests that the *Rhacomitrium* has locally

advanced from above, and has captured the bare surfaces between the wave-like strips of the *Calluna* mat, and has then spread from these as centre. In *The Vegetation of Caithness* it was stated that the *Calluna* mat occupies surfaces which the *Rhacomitrium* was forced to vacate owing to the severity of wind erosion, and this may be so in some cases, but a study of the passage between the associations on Ben Armine rather supports the view given above, since the type of erosion and growth of the *Calluna* mat usually results in the wave-like type of formation, while wind erosion of the *Rhacomitrium* carpet is usually more irregular, and often results in complete removal.

The *Calluna* mat association differs according to the station studied. When considered in relation to each individual mountain summit its

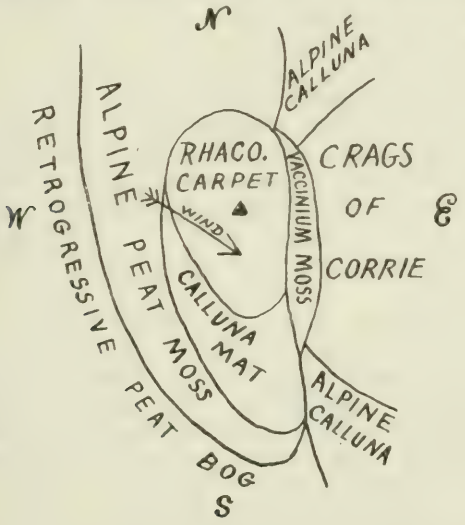

FIG. 1.—The Relations of the Summit Plant Associations.

outer margin is generally in contact with alpine peat-mosses, while its inner margin, if present, shows a passage into *Rhacomitrium* carpet as described above.

Diagrammatically the plant associations of a summit may be shown as in Fig. 1.

The differences in the *Calluna* mat association depend on (1) The approach of the alpine peat-mosses, (2) the approach of the *Rhacomitrium* carpet, (3) the degree of wind erosion, and (4) the degree of surface creep of the mountain-top debris.

As we pass from the alpine peat to the *Calluna* mat we find successive zones somewhat as follows:—

(1) Alpine peat mosses with *Sphagnum*, etc.

(2) *Juncus squarrosus* dominant, *Calluna* mat-like (closed), *Rhacomitrium*, *Cladina*.

(3) *Calluna* mat-like (closed), *Carex rigida* (abundant), *Rhacomitrium*, *Cladina*.

(4) *Calluna* mat-like (closed), *Cladina*, *Empetrum*, *Lycopodium alpinum*.

(5) *Calluna* mat-like in patches or wave-like from wind erosion, *Azalea procumbens* (mats), *Antennaria dioica* (dwarf), *Lycopodium*, *Selago* (dwarf), *Carex rigida* (dwarf), *Lotus corniculatus* (dwarf hairy), *Aira flexuosa* (prostrate), (mat), *Cladina* (in *Calluna* mat), *Hypnum Schreberi* (in *Calluna* mat).

All the plants are prostrate or very dwarf.

Where the slope is greater there is a marked creep of the debris to form a series of terraces and short abrupt vertical steps (from a few inches to two feet high), running parallel with the contours of the slope. In such places we find the surfaces of the exposed terraces have a plant association much like that described above (5). The little steep banks, on the other hand, show an association in which *Alchemilla alpina*, *Thymus Serpyllum* (Thyme), *Festuca vivipara*, *Carex rigida*, *Lotus corniculatus*, *Arctostaphylos alpina* and *Juncus trifidus* are prominent.[1] Where the slipping of the debris is a marked feature the surface is often covered with patches of *Arctostaphylos alpina*, *A. Uva-ursi*, *Thymus Serpyllum*, *Erica cinerea* (Bell Heather) (dwarf, prostrate or cushion-like), *Vaccinium Myrtillus* (prostrate) and *Calluna* (scattered and cushion-like).

We thus see that the *Vaccinia*, *Erica*, and *Thymus Serpyllum* rather avoid the wind-swept places in the *Calluna* mat, unless there is much slipping of the surface.

The *Calluna* is found in all stations, but varies in habit according to the conditions imposed by migratory factors. In the wind-eroded places it is completely prostrate in the direction of the prevailing wind, and is wave-like in patches. Nearest the peat mosses it forms a closed prostrate mat; further away it generally becomes open, and forms parallel wave-like patches arranged at right angles to the direction of the prevailing wind.

On pulling up patches of the *Calluna* mat we find that the younger branches send down fine thread-like roots into the ground, while many of the older twigs and often the main stem have succumbed from exposure of their roots. The young shoots are all arranged in a close fastigiate manner, and their tips are usually turned downward towards the ground. The racemes of flowers are markedly secund and are often twisted and may face the ground. This type is evidently an extreme case of the form of *Calluna* named *Erikæ*.[2]

When *Erica cinerea* accompanies the *Calluna* it assumes the same prostrate growth, and produces fine adventitious roots from its shoots. Examination of the conditions under which this takes place shows that the layering of the shoots by fine wind-driven debris is an important factor. Where the debris is subject to greater disturbance and movement through creep there is a more rapid accumulation of sand and fine

[1] Compare *Types of British Vegetation*, p. 313.

[2] Dr. C. E. Moss has confirmed this identification.

debris, wherever the vegetation temporarily arrests erosion, and the *Calluna* and *Erica* then assume another type of growth, that of more or less rounded cushions with close-pressed vertical fastigiate branches. On cutting into these cushions we find that there is an even greater development of fine adventitious roots from the branches than in the mat-type of growth. Sections of the cushions, subjected to prolonged beating to remove the sand, appear as a shaggy mass of pale brown fine capillary roots. It is therefore probable that it is the accumulation of debris and burying of the shoots that acts as a stimulus to the production of the adventitious roots in both cases. The root systems thus evolved are large in proportion to any normal shoot system that can survive in face of the severity of the exposure to winds, and this disproportion between the root and shoot systems may act as a stimulus to the production of the close fastigiate branching met with in the mat and cushion types of growth.

Essentially similar conditions with cushion types of *Calluna* are encountered in blown sand, in places where rabbits prevent the elongation of the shoots, and here also the larger adventitious root system is balanced by the shoot system by a close fastigiate type of branching. But cases also occur on the blown sand near lochs isolated in the moorland, where the cushion type evolves purely from sand accumulation and exposure to wind.

A somewhat close fastigiate type of *Calluna* growth is also found on wind-swept parts of the moorland in parts of Sutherland, and especially on roches moutonnées which have become peat-covered, and are isolated as islands in lochs. The surface of the *Calluna* growth is perfectly smooth and rounded, and humus accumulates between the stems which send down adventitious roots. The cushion and mat types of *Calluna* growth would therefore appear to be due to causes which at the same time limit vertical elongation of the shoots and stimulate the adventitious production of roots. It is possible that other cushion plants have similar conditions regulating their growth habit, but many appear to have had this growth habit fixed by inheritance.

In the case of the cushion type on the mountain slopes the effects of creep of the debris is a more potent factor than wind erosion. The creep is doubtless partly due to the wind eroding the debris, but chiefly to gravity and to the formation of gliding-planes where water accumulates beneath the surface. By digging beneath the debris at places where such slopes abut on the alpine peat-mosses forming their lower boundary, we find that the debris often overlies peat of some thickness, showing that the debris and its plant associations have advanced over the peat-mosses in these directions. Locally two or three layers of debris were noted in the peat, pointing to short phases of advance and retreat of the peat-mosses along the boundary. But peaty layers also occur in the debris at a distance from the margin on some of the slopes examined.

On some of the flatter parts of these tops the alpine peat-mosses are drying up and undergoing wind erosion, and patches of the superficial layers of the peat are undercut and let down on the bared surface of the

debris. The *Calluna* in these patches then acquires the type of growth of the *Calluna* mat association.

The present evidence therefore points to the following conclusions :—

(1) That the rounded summits of Ben Armine were at one time covered by alpine peat-mosses which gradually underwent shrinkage and wind erosion, the process beginning at the highest and most exposed places.

(2) That the *Calluna* mat has evolved from the peat mosses through such erosion, and therefore marks a retrogressive stage from the peat mosses. Its constitution and vegetative type are, however, the direct results of migratory factors of surface change.

(3) That as the process continued the debris became exposed and underwent wind erosion and creep, gradually gravitating and invading parts of the peat-mosses covering the slopes beneath it.

(4) That the process has not been uniformly continuous, since the alpine peat-mosses have sometimes advanced over the front of the debris.

(5) That the *Rhacomitrium* carpet is a progressive type of association which has taken possession of the bared tops wherever it could obtain a hold.

(6) That it is generally successive to the *Calluna* mat along their boundaries, but is very unstable if exposed to drought as well as strong winds. It is therefore largely controlled by migratory factors of surface change.

(7) That ring-like patches and crescents of *Calluna* sometimes occur in the *Rhacomitrium* carpet, but it is doubtful if the *Calluna* mat ever replaces the *Rhacomitrium* carpet when this has been destroyed by wind.

(8) That the *Rhacomitrium* carpet is succeeded by more stable types of vegetation, by alpine peat-mosses on exposed places, and by alpine *Vaccinium* moss heaths on protected slopes.

(9) That a wetter climate would cause an advance of these associations on the *Rhacomitrium* carpet, and an advance of the latter on the *Calluna* mat.

(10) That there is evidence pointing to local advance of the *Calluna* mat at the expense of the peat-mosses, and that this would probably increase under a drier climate.

(11) That an advance of the *Calluna* mat at the expense of the peat mosses has been effective during a late phase of retrogression in the moorland, but that an advance of the *Rhacomitrium* carpet has perhaps been of more importance of late years, and points to a new phase of progression.

(*To be continued.*)

The *Alabama's* last harbour,

LOST IN THE ARCTIC: A REVIEW.[1]

(With Illustrations.)

THE expedition of Captain Ejnar Mikkelsen in 1909 was a sequel to that of Mylius Erichsen in the *Danmark* to north-east Greenland in 1906. How Mylius Erichsen, with Høeg Hagen and the Eskimo Brönlund, all perished after completing their exploration of the unknown coastline from 78° N. to 83° 30′ N., is a story that will never be forgotten. Brönlund, the last survivor, dying of cold and starvation, dragged himself to a place where he knew that search must eventually find his body, and with it the records of success at the cost of three lives. Lieut. A. Trolle told that story in the pages of this *Magazine* (vol. xxv. pp. 57-70). But the diaries and maps of Erichsen and Hagen were still to be found before the story of their work could be completed. It was with this object that Captain Ejnar Mikkelsen organised the Danish expedition in the *Alabama* in 1909. The expedition was not one of exploration, nor did it carry a scientific staff. It was a search expedition which could only hope incidentally to add to our knowledge, so well had the work of Mylius Erichsen and his brave companions been done. But that in no wise detracts from, in fact it rather adds to, the marvellous record of this latest Danish expedition.

The sloop *Alabama*, of forty tons, with seven men on board, left Copenhagen in June 1909. She called at the Danish settlement of Angmasalik, on the east coast of Greenland, to collect dogs in place of the unsatisfactory ones which had been shipped to the Faroes to meet her. The *Alabama* then made northwards, and after many difficulties with ice on this unapproachable coast, anchored off Shannon Island in the end of August. This proved to be her last voyage. A month later Mikkelsen and five companions set out northward on a sledge journey to Lambert's Land to try and find the bodies of the three lost explorers. They travelled over the sea ice and met with many difficulties, but ultimately found Brönlund's body. Those of the others they failed to find. This trip revealed nothing new, for Captain Koch of the *Danmark* had found in 1908 all that there was to discover. Within a week of Christmas the sledge party returned to winter quarters in the *Alabama*. On March 4, 1909, the great journey was begun. The party consisted only of Mikkelsen and Iver Iversen, and their destination was Danmark Fjord, or beyond if necessary, with the object of finding all the missing records. They started over the sea ice to Dove Bay, where the inland ice was ascended and followed in continual gales and blizzards to the head of Danmark Fjord. There they followed the north coast of the fjord and came on Erichsen's camping-places, and recovered two important dispatches of his. The first cast considerable doubt on whether the three

[1] *Lost in the Arctic: Being the Story of the "Alabama" Expedition, 1909-12.* By Ejnar Mikkelsen. Illustrations and a map. London: William Heinemann, 1913. Price 18s. net.

men in their starvation march had really crossed the inland ice to Lambert's Land, or whether they had not followed the coast in their retreat to the ship at Cape Bismarck. The second contained word of an important discovery, namely, that Peary Channel between Peary Land and the mainland of Greenland does not exist. Navy Cliff and Heilprin Land are connected by land. Erichsen had reached Peary's Cape Glacier, and made this discovery, and rightly changed the name of Independence Bay to Independence Fjord. This news upset Mikkelsen's plan of penetrating Peary Channel to Robeson Channel (here wrongly called Robertson Channel), and so getting in touch with the West Greenland settlements and home by a less difficult route than he had come. He had not provisions for the journey round Peary Land, and could not risk crossing the high inland ice. Finally, at Cape Rigsdagen, at the south of the entrance to Independence Fjord, he and Iversen decided, on May 27, to turn back, and none too soon if they were to reach the ship before winter set in.

The return journey was to be round the coast in order to examine depôts in the hope of finding records. And now began the most arduous sledge journey on record, if we take into account the conditions and season of travelling and the scanty rations on which most of it was performed. It was a longer route than the outward journey, and the difficulties were immeasurably greater. The only compensation was the depôts of food along the route left by the *Danmark* expedition, and, as luck would have it, most of these had been used by that expedition or contained food that was scarcely fit to eat after several years' exposure. The two men had a journey of at least 750 miles before them, and they started it with twelve days' provision for the dogs and forty-five for themselves, and two and a half months in which to do it. Mikkelsen's orders to the *Alabama* were that she was not to leave Greenland before August 15 unless absolutely necessary. If they did not return by then, the ship was to leave for Denmark, and they would trust to being picked up by a sealer, several of which touch at Shannon Island every year. There was scarcely a chance that they could return in time, but they meant to try. Almost at the very start their misfortunes began, and then followed one after another in endless repetition such a series of difficulties and misfortunes as surely no polar traveller has ever lived to record. Rough and treacherous ice, slush, open water, steep ravines, glacier rivers, rocky coasts, crevasses, bad weather, want of food, absence of game, empty depôts, scurvy, death of dogs—the list is endless—no conceivable misfortune but befell these two tireless men, yet still they held on and never gave up hope. It is a story of marvellous tenacity of purpose and great endurance, and the crowning wonder of all is that they lived to tell the tale. A hundred times they were near death, and escaped with a laugh. Even forty hours on a cluster of rocks in the middle of Skaerfjord in a raging storm did not dismay them; nor did a hundred miles on practically nothing to eat. At length they had to abandon their tent and sleeping sacks and sledge, and struggle onward eighty miles to Danmark Haven, where they knew they would find food, and then at last they reached the *Alabama* on November 25,

Sledging in an ice valley.

Difficult going.

only to find that she had foundered and been abandoned. The two men were doomed to winter alone, after their nine months' isolation on this terrible journey. In the spring they went north again to Skaerfjord to pick up their abandoned note-books. The greater part of Mikkelsen's diary had been eaten by a bear, but fortunately Iversen's was complete. On their return to Shannon Island they passed the summer anxiously awaiting a ship, but in the end had to face a third winter, which they decided to spend at Bass Rock, some forty-five miles south of their previous quarters. Presumably this was decided on as putting them more on the track of sealers the following summer. Their disappointment must have been intense when they found there a note to say that on July 25 a sealer had called and sailed away again. That was when they were encamped on the north-east end of Shannon Island, only sixteen miles away, looking expectantly for a sail. But they made the best of things, and settled down for the winter, trying to keep themselves occupied to avoid their none too cheerful thoughts. There were stores enough, and their ammunition lasted out, so that fresh meat was procurable. But the inaction and anxiety was telling on them, and they decided that in spring they would make a desperate attempt to sledge southward to Angmasalik, and so make good their escape. When the time came the attempt was made, but had to be abandoned, for their remaining means of transport were quite inadequate for this journey of over eight hundred miles. Then at length, late in the summer, a sealer calls and brings deliverance to these hard-tried explorers. Ten days later, in August 1912, they are in Aalesund on their way home.

Mikkelsen's companions had left Shannon Island in a sealer shortly after the foundering of the *Alabama*, salving everything possible for the use of him and Iversen before they left.

The greater part of the volume is occupied with the record of the long sledge journey, but despite all the detail introduced, the story never flags for an moment. One reads with eager interest from beginning to end, divided between admiration for the men and horror at their seemingly hopeless position.

The two final winters and intervening summer are briefly sketched, but after all there can have been little to record. It must have been a time of almost uniform monotony.

A number of illustrations (some of which we are enabled to reproduce here) and a good map add to the value of a volume which we are glad to see, and which adds another glowing page to the record of Denmark's work in Greenland. The book is all the more important since it is the first in English to record the striking explorations of Mylius Erichsen and his comrades. Mikkelsen's and Iversen's three years' work was a worthy tribute to the memory of those men.

R. N. Rudmose Brown.

THE THULE OF TACITUS.

By E. M. Horsburgh.

What place was meant by the Thule of Tacitus is a question which has often been asked and to which many different replies have been given. The Shetlands, the Faroes, Norway, Iceland, and even Greenland have all been suggested, but no very conclusive reasons have been advanced for the selection of any one of these places.

In the world-map of Ptolemy, about 160 A. D., Scotland is represented as pointing in a due easterly direction, almost at right angles to England, which is shown fairly correctly. One theory which has been advanced in explanation of this is that the Roman troops of Agricola marched possibly to the north of Scotland, and that the fleet, battling against the prevailing westerly winds, took so long to make the passage and rejoin the army, that, on comparing the itinerary of the troops with the log of the fleet, geographers arrived at the conclusion that Caledonia must taper far to the east, forming a kind of peninsula.

From the writings of Tacitus, however, it seems that the main army did not march to the extreme north of Scotland. During the great campaign which culminated in the battle of Mons Grampius, the fleet and army operated together, the army marching up the east coast, while the fleet, which would be used to convey stores and munitions of war, coasted along in touch with the troops. This, it is interesting to remark, was the method by which all the great subsequent invasions of Scotland were carried out, from the days of Edward I. to the time when David Leslie, though defeated at Dunbar, had yet out-manœuvred Cromwell.

After the battle of the Grampians, Agricola led his army into the territory of the Boresti, and apparently fitted out a smaller naval expedition to explore the north of the island. Though the context is obscure, and though minute details of the geography of a remote and barbarous spot would not appeal to so vivid a word-painter as Tacitus, yet he makes it clear that this expedition at all events reached the extreme north of Scotland. Agricola was probably not with this division, but he seems to have given the command to a high official, the admiral of the fleet *(praefectus classis)*. When the Roman ships had rounded Duncansby Head and viewed the coastline stretching west towards Dunnet Head and Cape Wrath, it was evident that the extreme northern end of Caledonia had been reached. The fleet and army would probably form a camp at Scrabster Roads—the most suitable anchorage in these parts—preparatory to crossing the Pentland Firth to explore and annex the Orkney Islands.

The wild speculations which insist that the fleet made a Columbus-like voyage from this point to Norway, Iceland or Greenland seem quite untenable, contradictory to the words of Tacitus, and a violation of common sense. Is it to be expected that a fleet which probably carried the food supplies and general stores of the army, and which would be

necessary for the safety of the expedition, would have been allowed to stray aimlessly all over the waters of the North Sea and Arctic Ocean? Winter with the dreaded storms of the north was also approaching, and unnecessary risks could not be taken. If the fleet had actually cruised to the north of the Orkneys, could we possibly have had the passage which explains that the great Northern Ocean is so sluggish that its waves are not raised high by storms as in other seas? Assuredly the Roman fleet had not been so far north as the Roost of Sumburgh.

Where then did it go? Their orders as we read were distinct—to explore the Orcades, and to go no further (*quia hactenus jussum*). The giver of these orders could not have been Agricola, if he were at this time leading his victorious troops towards their winter quarters, perhaps at Rosyth, unless indeed he were actually on this enterprise, a suggestion which seems extremely unlikely. They were probably issued to a small exploring division by the commander of the expedition from his camp near Scrabster.

So far then the ships had only coasted along the eastern shores of Scotland, and that too in the fine weather of summer. They had been under the shelter of the land, at least during the prevailing westerly winds. But on a first visit to the Orcadian waters they would now encounter many dangers. They would have their first experience of ten-knots tides, and of the "Swelkie," where later King Haco lost a "long keel," and would find themselves among some of the most dangerous skerries and tide races of the world.

Once among the islands they might be swept out past the sunken rocks of Hoy Sound, and back through the boiling roost of Eynhallow, adventuring through many perils along these uncharted shores as far as North Ronaldshay. By that time their orders were carried out. Not only was it contrary to instructions to go further, but what could so practical a people possibly gain by faring forth on the open ocean with the approaching danger of the winter storms! (*Et hiems appetebat.*) The safety of the whole expedition was involved in the peril of the fleet, and there seems little doubt that the Romans would not go beyond North Ronaldshay.

From this point then as they gazed over the great turbulent northern ocean they would see a horizon unbroken by any line of coast, and in the far distance one speck of land, a rugged solitary giant pillar of rock—not Sumburgh Head in Shetland—but what we know as Fair Island. This outlier, the halfway post on the long journey from Orkney to Shetland must have been the northern limit of the Roman world of Tacitus. *Dispecta est et Thule!*

SCOTTISH GEOGRAPHY IN SCHOOL TEXT-BOOKS.

By JOHN MURRAY, M.A.

I HAVE before me seven comparatively recent text-books of geography,[1] some of general application, others dealing with restricted areas, but all intended for school use. In a perusal of the volumes I have paid special attention to the sections on Scotland, and have marked what seem to me inaccuracies, mis-statements, and terms or passages which might lead to misapprehension. The grammar in several of these text-books is rather slipshod, but I do not wish to weary my reader with lists of grammatical mistakes. I desire rather to appeal to teachers of geography.

Of the authors of the books in question, two are termed on the title-page English masters, one is called a Geography master, two are assistant-masters in English schools, and two (apart from teaching) are recognised experts in geography. So far as I know, six of the seven are either English or in English schools. Of the publishing firms, two or three have no Scottish house.

Most of the writers give us a few items from Scottish history. These items are intended apparently for our Southern neighbours. The following sentence is refreshing:—"Scotland, unable to cope single-handed with her aggressive and wealthy neighbour, was compelled to seek the aid of France, and the treaty of alliance with France made by John Balliol in 1295 lasted for 300 years" (3). No doubt Scottish historians will be glad to know what tangible assistance the French gave us up to and at the date 1314! Teachers in the Highlands are told that "Culloden, to the north-east of Inverness, is where the Young Pretender *turned sullenly* at bay in 1746" (3). The phrase italicised is specially good. Another note says—"Culloden Moor, where the Young Pretender was defeated in *1745*" (4). Then, for the further benefit of the much-maligned Celts, let me quote the following:—"Whisky distilling is a *typical* Highland industry"; "we find some (Highlanders) speaking their native Gaelic language and a few wearing a *peculiar dress*"; in the Highlands "fishing is the mainstay of the people, and fish and oatmeal the chief foods" (by the way, what is the verb to the nouns "fish" and "oatmeal"?); "deer and grouse on the moors, . . . and salmon in the streams fare better than men."

To come to geography proper. The geography teacher who has tried to eradicate certain time-honoured myths from his pupils' minds will read with astonishment that "the Atlantic Ocean has its waters heated by the Gulf Stream, which sweeps across it in a north-easterly

[1] (1) *The Clarendon Geography*, vol. i. (Herbertson).
(2) *A Text Book of Geography* (Fry).
(3) *Europe* (Snape).
(4) *A Regional Geography of the British Isles* (Parkinson).
(5) *A Systematic Geography of the British Isles* (Webb).
(6) *A Geography of the World* (Evans).
(7) *A Junior Geography of Scotland* (Frew).

direction from the Gulf of Mexico, and strikes the north of Scotland" (5). Perthshire teachers will rejoice in that they are now made aware that the Tay "passes the *towns* of *Dunkeld*, *Scone*, and Perth" (5). To them also the following sentences may be of some use:—"Among other lakes noted for their beauty are Loch Awe in Argyllshire, and Lochs Tay, Rannoch, Ericht, and Earn, in Perthshire. The last two are connected with Loch Rannoch, as their surplus waters fall into it" (5). The latter sentence is delightful. Apparently the geography of Perthshire is confusing, for another author informs us that "Callander (is) on the *Earn*, and Crieff on the *Teith*" (1).

Then, apart from orographical features, Harlaw is proof that the Aberdonians would resent their city being called "the largest town in the *Highlands*" (3). The mention of Aberdeen may serve to introduce this statement—"Peterhead has long been famous as a port for the whale fishery" (5). The geography teacher might forgive this if the author changed "has been" to "was," but Peterhead's herring-fishery remains unmentioned by the same writer, who also astounds us when he says that "Wick is the *chief seat* of the herring-fishery, and Thurso and Stornoway (*Kincardine*) have a similar trade."

Then from what I know of the county, I am disinclined to believe that granite is quarried in Dumfriesshire (6). Are not the granite quarries in Kirkcudbrightshire, as see p. 79 of (6)? Again, is Tinto Hill ever called Mount Tinto (7), is Ben Cleuch (or Bencleuch) written Ben Cleugh (7), is Kinnaird Head styled Kinnard's Head (7), is Duncansby Head usually termed Duncansbay Head (3) and (6)?

The Scottish railways have come in for a fair share of bad treatment. Quite a common error in the Railway Maps of the text-books is to mark the portion of the Caledonian Railway from a few miles north of Montrose to Aberdeen as North British, *e.g.* (5). The same mistake occurs in a recent atlas produced by one of the foremost firms of cartographers in the United Kingdom. The North British Railway has running powers only over the portion mentioned. In the Railway Map of one text-book (2), the Great North of Scotland Railway is entirely omitted, and in that of a second (4) it is shown as passing from Aberdeen round by the coast through Peterhead, Fraserburgh, Banff, and Elgin. Curiously enough, in direct opposition to this second map, which shows correctly the course of the Highland Railway, the text states that the Great North of Scotland Railway's route is "along the coast to Inverness, Thurso, and Wick, running a branch across country to Strome Ferry, near the Island of Skye." The same map (4) shows no direct and main Caledonian Railway route from Perth *viâ* Forfar and Stonehaven to Aberdeen, and indicates a Joint Caledonian and North British Railway line from Aberdeen to Dundee! Further, is Portpatrick the port for Ireland as indicated, and is Strome Ferry the terminus of the "Dingwall" branch of the Highland Railway?

In a "Commercial and Industrial" Map contained in one of the text-books (7), Bervie is marked—"Woollens, Chemicals." I am sure that the inhabitants of the small fishing burgh will rejoice at the importance of their place, all the more since Montrose has attached to it only

"Fishing." Then Banchory is inserted, while Stonehaven is omitted. Dyeing is not given as a Perth industry; and Dumfries gets the credit of ironworks, while the Sanquhar coalfield is not marked.

I append the table given under. It is based on the six books which deal "regionally" with England and Wales, Scotland, and Ireland as separate sections, and may prove both interesting and instructive. The pages include maps, diagrams, and figures.

	England and Wales.	Scotland.	Ireland.
(1)	51	16	23
(2)	32	13	9
(3)	26	9	6
(4)	103	39	28
(5)	43	16	16
(6)	39	12	10

It is outwith the scope and purpose of this brief article to attempt to lay down or indicate at any length the lines on which Scotland ought to be treated in school text-books, but I may be allowed, on the plea that mere negative criticism is often of little avail, to make a few suggestions. In the first place, teachers of geography desire to see text-books well, or at least clearly, written and free from grammatical mistakes. From one of the seven I could make a list of a score of errors in grammar, most of them due undoubtedly to hasty revision on the part of the author. It is aggravating to a teacher to see an otherwise good book marred by small mistakes, and it is harmful for a pupil to use such a book. In the second place, while fulness of detail cannot and need not be insisted upon, accuracy of detail is altogether desirable. Many of the inaccuracies pointed out above could have been corrected from reliable maps and reference works. Of the latter, the finest are Geikie's *Scenery of Scotland* and Mackinder's *Britain and the British Seas*. In the third place, the treatment of Scotland ought to follow the three well-recognised geological and orographical divisions of Southern Uplands, Central Lowlands or Midlands, and Northern Highlands. In each division, the differences—climatic and industrial—between east and west should be carefully noted. In a consideration of the railways, the main point is their relation to and dependence upon physical features. The routes linking Edinburgh and Glasgow with England are of especial interest. Lastly, in the case of the towns, the reasons for their locations must be dwelt upon. Obvious and convenient examples are Edinburgh, Glasgow, Perth, Stirling, Aberdeen, Dumfries, and Inverness.

Erratum.—GEOGRAPHICAL DESCRIPTION OF FIFE, KINROSS AND CLACKMANNAN:—On page 145 of this article, line 19 from top, the word *eastwards* should read *westwards*, and in line 25 *westwards* should read *eastwards*.

GEOGRAPHICAL NOTES.

EUROPE.

Geographical Causes of Italian Emigration.—Dr. Alfred Rühl contributes to the *Zeitschrift der Gesellschaft f. Erdkunde z. Berlin* (9. 1912) an article with this title. It will be remembered that we published here (vol. xxvi., p. 337) a paper upon Italian Emigration by our corresponding member, Mr. Victor Dingelstedt. This fact renders it unnecessary to give the figures contained in Dr. Rühl's paper, and we shall confine ourselves to his discussion of the causes of the emigration. He begins by pointing out that the Italian annexation of Tripoli and the war there must be considered in relation to the process of emigration which is depopulating parts of Italy. When the Government sees the constant stream of emigrants quitting its shores it is natural that it should seek to acquire a Mediterranean colony to which the stream may perchance be directed, with the result that the emigrants will not be lost to the motherland. In earlier days Italian politicians were wont to console themselves with the thought that, heavy as was the emigration rate, the birth-rate more than kept pace with it. As Dr. Rühl points out, however, this overlooks the fact that the emigration is not equally distributed over the country, so that in certain regions, especially in the south, the population is steadily diminishing, with economic results of much importance. To say that the cause of the emigration is over-population seems inexact, in view of the fact that it is the thinly peopled regions which furnish the most emigrants, and the country districts rather than the towns. Nor is it accurate to say that poverty is the prime cause, for from the poorest regions, *e.g.* Sardinia, there is little emigration, and in Sicily it is noted that the communes with the highest rate are those where wages are neither low nor high. While among the contributing causes are certainly the large estates, the high taxes, the want of technical education, and so on, Dr. Rühl emphasises other causes of a purely geographical nature.

Among these are to be reckoned the large percentage of mountainous land in Italy, the elevation being often such that even with elaborate terracing the more delicate and profitable crops cannot be cultivated. It is noticeable that the mountainous regions have a high percentage of emigrants. Further, though the plains are often fertile, yet, with the exception of the great plain of the Po, they are liable to malaria. This is especially true in the south, where, for example in Cotrone (Calabria), one-third of the inhabitants are known to be infected. The malarious regions are again regions with a high percentage of emigrants.

As is well known, the Apennines are young mountains, and among the soft rocks which occur in them clays are frequent (cf. vol. xxvii. p. 541). These predominate in the North Apennines, and with irrigation form a fertile soil. Further south, limestones occur, forming

in the Abruzzi, Molise and Basilicata highly infertile areas. Here the emigration rate, low to the north, again becomes high. To the infertility of the soil in these regions is added, as a factor in promoting depopulation, the scarcity of water. Apulia especially suffers from this, and water is actually carried there in special trains from Naples to be sold. A scheme for supplying water in a great aqueduct has been proposed, and work is already begun, but it will be long before it is completed. Apart from the presence of soft rocks in the Apennines, with the consequent frequent slips and falls of earth, their geological youth brings great difficulties in the way of intercommunication, owing to the steep gradients, narrow valleys, and so forth. The result is that railways can only be constructed at great expense, and even road construction is prohibited by the expense in the poorer regions, which must thus continue poor. The author instances Bova in Calabria, which has 4600 inhabitants, as a place to which access is only obtainable first by a torrent bed, and afterwards by a dangerous mule path. In Sicily there are many communes which are without driving roads, and some have no proper access at all. Another disadvantage of the recent uplift is, of course, the constant liability to earthquake shock. The danger of volcanic eruption, on the other hand, is probably counterbalanced by the fertility of the volcanic soil, as indicated by the dense population round Naples.

The climate also is disadvantageous in that rain is deficient when it is most wanted, and comes in devastating downpours at other seasons. Devastation by swollen torrents often reaches serious dimensions, and the danger is increased by the deforestation which goes on ceaselessly, though its dangers are now well known. There is no doubt that the superabundant rainfall could be stored for irrigation, and also used as a means for generating electric power. It is in this white coal that the author sees the greatest hope for the future. It is being now utilised to some extent round Naples, chiefly with foreign capital, and also in Sicily. Italy must, however, he believes, remain chiefly an agricultural nation, and it is in the improvement of agriculture that her greatest hope lies.

Spanish Emigration.—To the above account we may add a brief note on Spanish emigration, considered by M. Albert Girard in the *Annales de Géographie* for November last. Though far from reaching the dimensions attained in Italy, emigration from Spain, after a temporary set-back due to the Spanish-American war, is steadily rising, and now probably amounts to about 200,000 persons per annum, out of a population of less than 20,000,000, or one per cent. in a thinly peopled country. The loss to the Mother Country is here chiefly permanent, for the Spaniard expatriates himself more willingly than the Italian. As in Italy the emigrants are chiefly agriculturists, and the agricultural population of Spain is but 29 per cent. of the total. Curiously enough, while in Andalusia, as in Italy generally, the size of the estates is given as a cause of emigration, in Galicia, Asturias, and a part of Leon, it is the excessive subdivision of the land which is said to be the

cause. In this case however, the land is not freehold, and will not support the dues to the overlord in addition to the heavy taxes. The unequal distribution of the taxes, which press heavily upon the rural population, and the uncertainty of the rains are other predisposing causes.

The chief regions to which the emigrants direct themselves are the Antilles, especially Cuba, South America, especially Brazil and the Argentine, and (now to a diminishing extent) Algiers.

The two articles summarised show admirably the incapacity of the peasants of Southern Europe to compete with the farmers of the new lands across the sea, at least so long as the standard of expenditure of their various Governments is set by that of the industrial nations to the north.

Asia.

Geography of North-West Mongolia.—Dr. J. G. Granö, of Helsingfors, contributes to a recent issue of the *Zeitschrift fur Erdkunde zu Berlin* what he describes as a geographical sketch of North-west Mongolia, based upon his own travels in the region. From the paper, which is a somewhat lengthy one, we pick out a few facts of interest. One striking feature of the region is the abrupt way in which the mountains rise from the plains, the approximately level surface of the plains abutting suddenly upon the mountain slopes, the absence or scarcity of vegetation rendering the contrast all the sharper. The plains can be divided into two sets, the high-lying peneplains, occurring among the mountains and having the characters sometimes of desolate steppes and at others of alpine meadows, and the low-lying plains. The latter are sometimes steppes or deserts alternating with meadow land in the damp regions, and may be subdivided into two, those lying along the banks of the rivers, and the basins of internal drainage in whose deepest part lies a salt lake. The climate varies, of course, greatly with elevation, but generally the winters are cold, clear and still, the summer windy and rainy. The northern mountain region and the Dzungarian slopes of the Altai are moist, while the level regions are dry, though the author doubts if the high plains are so dry as has been believed. Autumn is everywhere the pleasantest time, for though the nights are cold the days are sunny and dry, and the nocturnal cold causes the insect pests to disappear.

The climatic variations are reflected in the vegetation. In the Syansk, the Tannu-ola, the northern Khangai, and on the western slopes of the Altai, there are extensive woods of larch, pine, Siberian pine, fir, aspens, and birches. Elsewhere the woods only occur on the highest slopes, especially the northern ones, and are there thin. Above the tree limit are Alpine meadows rich in flowers; such plants as globe flower, monkshood, larkspur, poppy, and so forth, occur below, with alpine forms like dryas, gentian, etc., higher up. Below the woods also meadows occur with many gaily coloured members of the ranunculus family. Further down come the steppes, which in the dry regions also ascend high up the slopes. These steppes are scantily covered with grass,

sometimes mingled with edelweiss to such an extent that they may be called edelweiss steppes. In the river valleys there are sometimes light woods of poplar and birch, or these trees may be replaced by willow and sea-buckthorn. In the dry regions bushes of the Siberian pea-tree (*Caragana*) predominate, and there are few regions wholly devoid of vegetation.

To this general description we may add a brief note on two contrasted regions traversed by the author. In the west Syansk mountains he found very dense wood, of great extension, which was predominantly coniferous, though aspens and poplars also occurred. So dense is the wood that it is difficult to find grazing for the transport animals and travelling is difficult. Rain and mist are frequent, the paths are often nearly impassable, and insect pests are numerous. Further, the rivers have to be crossed at fords, and they are often so swollen with rain that it may be necessary to wait days before the crossing can be made. The original occupants of this region, the Soiots, who are nomad hunters, are now rarely met with, though game is abundant. On the Russian side of the mountains there is a settled population only where gold washing is carried on, but parties of fishers may sometimes be met with on their way to the river Bei-kem, which is rich in fish. Quite different are the conditions in the Khangai region. Here woods are absent save on the highest summits, pasture is abundant, and the slopes are so gentle and the passes so easy, that it is possible to take carts from Uliassutai to Urga over the mountains. On account of the abundant pasture the region is well peopled, there being great groups of yurts, with here and there a pagoda or a convent and Russian or Chinese factories. Caravans are constantly encountered on the march, and consist either of camels or oxen. The author travelled with an ox caravan. The animals were harnessed to carts with creaking wooden wheels, the carts being loaded with tea, wool, and Chinese artistic goods, and drawn slowly over hill and dale. The escort in such cases rides on horseback, and in front of the caravan marches a flock of sheep which are slaughtered during the journey to supply food for the party. The dung of the animals is used as fuel, no wood being obtainable. The caravan halts for several hours in the middle of the day as the oxen are very sensitive to heat, but marching is carried on early and late. The escort, however, is far from remaining with the caravan all the time. Often the whole is left to the guardianship of a single individual, the other members of the party spending their time in visiting neighbouring yurts, where they are welcomed as news-bringers. Besides the caravans, many pilgrims, rosary in hand, are to be found upon the road, and lamas in their yellow mantles. Generally, it may be said that this region is prosperous and advanced, and the ruins show that through historic time it has been a centre of Mongolian culture.

Polar.

Mr. Stefansson's Expedition to the Arctic.—It is announced that the Canadian Government is to supply funds for Mr. Stefansson's projected expedition to Arctic North America. Mr. Stefansson, who

will take with him some Canadian students, and whose expedition is to be under the Canadian Geological Survey, is to leave Victoria, British Columbia, in June, and will proceed through Bering Strait to the hitherto unexplored region in the far north of Western Canada. The party will devote the four seasons during which the expedition is to last to the exploration of the islands and mainland of the Arctic coast, making their base either on the new land which it is hoped to reach, or on Land's End in Prince Patrick's Island. From this base the ship is expected to return to civilisation every year. Mr. Stefansson has done exploring work in this region for several years, in company with Mr. Leffingwell. In his last season's work he discovered, in Victoria Island, an Eskimo tribe of very light colour, and with marked European features. Among their weapons are copper knives with horn handles, such as those used by the old Norsemen, and Mr. Stefansson has suggested that the tribe may be descended from the old Norse settlers in Greenland. In his new expedition he will devote attention to the question of the origin of this interesting people. The party will include ten men of science, and the whaler *Karluk* has been selected as the ship of the expedition.

The Australian Antarctic Expedition.—Not long after the news of the Scott disaster, word reached Melbourne by wireless from Macquarie Island of the loss of two members of the Mawson Antarctic expedition. It appears that in December, Dr. Mawson, Lieutenant Ninnis, and Dr. Mertz were exploring new land 300 miles south-east of the winter quarters at Commonwealth Bay, in the west of Adélie Land. During the course of the journey Lieutenant Ninnis, with a dog team, and almost all the food, disappeared in an unfathomable crevasse. Dr. Mawson and Dr. Mertz had thus to start back to the hut with insufficient food and six starving dogs. They experienced bad weather and were obliged to live chiefly upon the dogs. On January 17, Dr. Mertz succumbed to the hardships of the journey, leaving Dr. Mawson to struggle on alone to the hut, which he reached on February 8, after a very difficult journey. On his arrival he found that the *Aurora* had left a few hours before, having been unable to wait any longer, but had left behind a search party of six men. On the return journey the *Aurora* took off Mr. Wild's party of eight. Mr. Wild reports the survey of land trending east and west, which has been named King George v. Land, and stretches from Kaiser Wilhelm Land to long. 101° 30′ and lat. 67° 30′.

General.

The Meeting of the British Association.—We regret to announce that the President-elect of the British Association, Sir William H. White, F.R S., died suddenly on February 27, in the middle of his activities in connection with the Birmingham meeting, which is to last from September 10 to 17. Sir Oliver Lodge is to take his place as President. The Sectional Presidents have now been appointed.

Professor H. N. Dickson is to preside over E (Geography), and of the related sections Professor Garwood is to preside over C (Geology), and Sir Richard Temple over H (Anthropology).

EDUCATIONAL.

The Cinematograph in the Teaching of Geography.—A proposal has been adopted by the Education Committee of the London County Council, advocating the expenditure of a sum of money to permit of the employment of the cinematograph in the teaching of elementary school children in London. In connection with this proposal, so far as it affects geography, Mr. H. J. Mackinder contributes the following letter to the *Times*:—

"As chairman of the Council of the Geographical Association, a body which consists of some nine hundred expert teachers of geography in all parts of the country, I desire by your courtesy to place on record the views of my council in regard to the proposed adoption of the cinematograph for educational purposes, to which attention is drawn in your issue of to-day by the debate in the Education Committee of the London County Council. At our last meeting it was unanimously agreed that we should protest against any large expenditure of public money for this purpose, unless after considerable experiment and adequate discussion by those who are practically experienced in education. We realise that there are some things which only the cinematograph can do, but in our opinion there is grave danger of its abuse, especially in connection with the teaching of geography. It is the constant aim of modern teachers of that subject to compel their pupils to visualise accurately and at will. Obviously effort must be called for on the part of the pupils, and we fear that the use of the cinematograph, except on rare occasions, will tend to decrease this effort, and thus to weaken the imaginative power instead of strengthening it. My council would not deprecate such a small experiment as is proposed by the Education Committee of the London County Council, but they feel that a warning is at the same time necessary, because large commercial interests are now involved in the manufacture of cinematograph films and apparatus, and we understand that an exhibition of such apparatus is shortly to be held, one of the sections of which will be educational. It is, of course, good business for the cinematograph companies to create an atmosphere among the public which shall lead to the expenditure of public money upon their wares. My association asks, however, for caution in such expenditure, not merely from motives of economy, but, as we believe, in the interests of the children and of the nation."

Summer School of Geography at Aberystwyth.—We have received a programme of a summer school of geography which it is proposed to hold at University College, Aberystwyth, during the present year, from July 28 to August 16. Five theoretical and five practical courses are offered, the latter including simple survey work.

The classes are to be conducted by the following gentlemen :—Professor H. J. Fleure (Human Geography, and Wales and its Borders) ; Professor Lewis (Civic History) : Mr. W. E. Whitehouse (Climatology and Trade Routes) ; Mr. E. S. Price (Land Forms and Natural Regions). The fee for the course is two pounds, and further information can be obtained by application to the University College of Wales, Aberystwyth.

NEW BOOKS.

EUROPE.

Biarritz and the Basque Country (Joanne Guide-Books). 4 Plans, 4 Maps, 40 Illustrations. Hachette and Co., 1912. *Price* 3*s*.

This is an admirable little guide-book to a region that is drawing every year an increasing number of tourists and visitors. In brief compass, compacted in small type, it provides almost everything one needs to know. To the sojourner at Biarritz, a town that to its 14,000 inhabitants adds every year a clientèle of about 40,000, to enjoy its breezes and its pleasures, and the interesting and beautiful region of the Basque country, this little work is invaluable. It is of handy size and moderate price.

Warfare in England. By Hilaire Belloc. Home University Library.) London : Williams and Norgate, 1912. *Price* 1*s*.

Although this is only a shilling book, it deserves attention on the score both of its subject and its distinguished author. Mr. Belloc sets forth, to begin with, the geographical features of England which have affected the strategy of campaigns. These are, in particular, its penetrating rivers with their estuaries, though the Severn for certain reasons is not a river of importance, the great ridge of the Pennines with the bar to northward advance made by the Mersey and the Aire on either side, and the "great obstacle, depôt and nodal point of London." Most of the campaigns in England of which we have detailed record are of the nature of civil wars, and local and accidental considerations play a prominent part in them. But in the campaign of 1066 and the following years the author is able to illustrate clearly the influence of the geographical factors he has premised.

At the end of the book is a chapter on "The Scotch Wars," in which his erudition has somewhat failed him. He lays it down that "An English army marches north by the easiest road of invasion, that along the eastern coast : it makes for Stirling, the nodal point of the south : or a Scotch army marches south by the same road." "To this use of the eastern route there is no true exception." The only exceptions admitted by Mr. Belloc are the advances into England of 1651, 1715, and 1745. But these, as occurring after the Union of the Crowns, are treated as mere rebellions.

This comprehensive statement requires large qualifications. For instance, there were at least ten invasions of Scotland by Edward I., and in only a minority of them was the eastern route followed. One may instance, as specially important, the invasion of 1301, when a division of the English Army under the Prince of Wales entered by Dumfries, while another under the King marched by way of Peebles. His successor, who used the coast route in the Bannockburn campaign for special reasons, made his last big effort, in 1322, by way of Lauderdale. On

the Scots side of the invasions of 1346 (Neville's Cross), 1513 (Flodden), and the contemplated invasion of 1542 (Solway Moss), none took the eastern route. It is perhaps worth while to mention two slips. Flodden was not fought by James VI., and Prestonpans is more than two hours' march from the capital. An index, as in other volumes of the series, would have been useful.

We wonder if Mr. Belloc is aware that a high-lying pass in the Roxburghshire hills still recalls the advance of a portion of Prince Charlie's forces in the name "The Not of the Gate" (Note of the gait or going). Enumerators are said to have been stationed there. Readers who wish a more extended view of the same subject are referred to an article in this magazine, vol. xvi. p. 138.

Arabic Spain: Sidelights on her History and Art. By BERNHARD and ELLEN M. WHISHAW. London: Smith, Elder and Co., 1912. *Price* 10*s.* 6*d. net.*

The period of Arab ascendency in Sicily has lately received attention, and this careful investigation of the contemporary field in Spain will stimulate other workers to explore this almost virgin soil. That intellectual but mysterious people, the Yemenite Arabs, brought learning and civilisation to a high eminence even before the ninth century, and the records here revealed are full of interest and romance. Their artistic remains, as in architecture and embroidery, receive full treatment, and the Greek, Roman, Coptic, and Persian sources in which they found their models carry the origins of their art into remote antiquity.

The authors are inclined to apologise for their ignorance of Arabic, and the handicap which this has imposed. But the defect seems to have been largely made good by the assistance they have obtained. Indeed they have been singularly successful in securing information not readily accessible. The eight years they have devoted to the study of the subject have been well spent. The book appeals to the eye from the clearness of its type and illustrations.

Voyage en Dalmatie, Bosnie-Herzégovine et Monténégro (L'Europe en Automobile). Par PIERRE MARGE. Paris: Plon-Nourrit et Cie, 1912. *Price* 3 *fr.* 50.

We have already reviewed here previous books by M. Marge, describing motor tours in other parts of Europe. Like his other works, this is much more than the ordinary motorist's notebook, for the author has not only made several visits to the regions described, but has got up the literature carefully, and has produced a book which will not only be useful to those who contemplate following his example, but also to the geographer proper. He refrains carefully from those elaborate descriptions of the petty incidents of travel which sometimes bulk so largely in accounts of journeys, and we are also spared would-be amusing accounts of his travelling companions. In short, his book is a serious piece of work, giving careful accounts of regions to which attention is being directed at the present time, and in regard to which accurate information is not too plentiful. Among the sections which we have read with particular interest are those discussing the *bora* at Zara, the author being himself witness of a violent tempest of this wind; the account of the Roman remains at Spalato, and of the curious contrasts of scenery and vegetation presented by the karst country. Readers of the book will probably feel a strong desire to follow the author's example, and tour through this interesting region, but he notes that it is for the most part accessible only to motor traffic, for railways are few, and the steep roads and the length of the stages make it difficult to use horse-drawn vehicles.

The book is well illustrated, but there is no map. It possesses—still a rare

merit among French books—an index in addition to an analytical table of contents. Details as to the roads are relegated to footnotes, and the text is light and easy reading—altogether we have greatly enjoyed the book.

Linlithgowshire (Cambridge County Geographies). By T. S. Muir, M.A., F.R.S.G.S. Cambridge: University Press, 1912. *Price* 1*s.* 6*d.*

The county of West Lothian or Linlithgow is not more than 120 square miles in area, and there are only two smaller counties in Scotland—Kinross and Clackmannan. But while it is small superficially, it is large in other ways, and although in point of area its place is only thirty-first among the thirty-three counties of Scotland, in population it ranks twelfth, and in density of population third. At last census the population was 79,486, and it is interesting to note that while many other rural communities have diminished, West Lothian has continued to grow steadily during the last twenty years at the rate of more than 1200 persons per annum. This satisfactory state of matters is due mainly to the growth of the mineral oil industry and to coal mining near Bo'ness and Bathgate. In this connection Mr. Muir makes one or two misleading statements which should certainly be corrected in future editions of his most useful and on the whole very excellent book. At page 68 he says, "It is more than probable that in the neighbourhood of Linlithgow coal lies beneath the igneous rocks, and as the more easily obtainable fuel becomes exhausted this deposit will be attacked." Unfortunately for this hopeful view the evidence from recent deep borings and other geological observations is all the other way. Again at page 69 we read, "The total quantity of proven coal in the county is over 200 million tons, of which one-fifth has been worked. Added to this is an estimated quantity of unproven coal amounting to about the same, and 1000 million tons are supposed to lie under the Firth of Forth, making a grand total of 1400 million tons." In the first place, the figures given of proven and unproven coal are probably greatly overstated, and the estimate of unproven coal is largely hypothetical. Unfortunately the supplies of coal are not nearly so large as was once supposed, and while there may be reason to believe that coal exists at certain places, it may be too deep or too poor in quality to be workable, and is therefore of no appreciable value. But the author makes a further mistake when he adds to the supposed four hundred million tons of unworked coal under the county a thousand million tons of coal under the Firth of Forth, making a grand total of fourteen hundred million tons belonging to the West Lothian coalfield still to work. In Dron's book on the coalfields of Scotland, the author refers to the coal under the *whole* of the Firth of Forth between Fife and the three Lothians as amounting to one thousand million tons, and does not suggest, as Mr. Muir would lead us to suppose, that this prodigious quantity lies hidden in the very small part of the underground coalfield pertaining to West Lothian alone.

At page 11 there is a statement that no river flows or ever did flow along the valley at Linlithgow. If Mr. Muir will refer to the *Scottish Geographical Magazine*, vol. xxviii. page 250, and examine the map at page 258, he will see that there is reason to suppose that a large river did flow north-eastwards along this valley before the Glacial Period.

At the top of page 19 a theory is given to explain the SW. and NE. trend of the British rock formations which does not seem to be in accordance with well-established geological facts. The theory of the formation of good anthracite coal is also misleading, as much coal found near volcanic rock is not anthracitic, and most good anthracite both in Wales and in America is not found near volcanic rocks at all.

At top of page 110 the date 1790 should, to be strictly correct, read 1788.

At page 118 it is stated that the Union Canal, like the Forth and Clyde Canal, is the joint property of the North British and Caledonian Railway Companies. This is a mistake, the Union Canal belongs to the North British and the Forth and Clyde to the Caledonian Railway Company. The writer has apparently no great hope for the future growth of Bo'ness, situated as the town is at the foot of a steep slope, with but little flat ground for public works and expansion along the shore. The flat ground has mostly been produced by reclamation of the shallow foreshore, and he refers to a proposal to reclaim an additional area of 2000 acres lying between Bo'ness and Grangemouth. No doubt such a proposal would have important geographical results, both for Bo'ness and Grangemouth. Bo'ness, however, being nearer the high ground, where there are excellent building sites, and also being only five miles from Rosyth, may yet develop into a residential town, and has considerable advantages from the garden city point of view, as well as deeper water at low tide than exists at Grangemouth.

We have noted these points of possible criticism in an otherwise comprehensive and very useful little text-book of local geography, carefully drawn up, and generally accurate, in order that future editions may be amended. There are numerous good illustrations, and three maps which are not so good. The first, or topographical map, does not show the Grangemouth new docks, which entirely altered the coastline at the mouth of the Carron, when constructed ten years ago. It is also badly coloured bathymetrically, as it makes no distinction in tint from the line of high-water to the five-fathoms line below low-water, and thus gives the reader no idea of the extensive and reclaimable foreshores in the estuary. The map of place-names is capable of some improvement and not quite so complete as might be expected. The geological map also might have been better made without additional cost. On the explanation of colours there is one mistake; "Calciferous Limestone" should read "Calciferous Sandstone Series."

ASIA.

The Lushai Kuki Clans. By Lieut.-Colonel J. Shakespeare. London: Macmillan and Co., 1912. *Price* 10*s. net.*

The people described in this monograph inhabit the Lushai Hills and certain hill-tracts of Manipur. They are of Tibetan or Burman stock, and are divided into Lushai, Old Kuki, Thado and Lakher or Mara clans, as well as into several smaller groups more or less influenced by the Lushais. They are scattered over 25,000 square miles, and speak many different dialects.

The author has succeeded in giving a very full and careful description of the people, their habits, customs, and beliefs, as well as interesting specimens of their folklore, and has two chapters on the language, grammar and vocabulary. The Mongolian type of countenance prevails; and the men are short and sturdy, with broad faces, high cheek bones, almond eyes and wide nostrils. Before the arrival of the British they were continually at war, and were much mixed up through the disintegration of small and weak tribes, whose members were obliged to take refuge with the more powerful clans. The chief crop is rice (also maize, tobacco, cotton, etc.), and many keep bison or mitzan, which are used in their sacrificial feasts. They cut down and burn stretches of jungle on which crops are grown for two years at most, and, in the case of the Lushais, are continually migrating to obtain forest to destroy. The author describes fully their marriage rites, tabus, death and burial ceremonies. The bachelors live in special houses, but each family has a house of its own. The power of the village

chief seems to depend very much on his personal influence, but there are interesting transitional states between the free man and the slave. Head-hunting seems to have existed at no very distant date. One curious legend deals with the origin of mankind. The ancestors of the tribe emerged from a hole in the ground as soon as an inquisitive monkey raised a stone which had closed them in. There is an interesting map of Hades, in which a valley is set aside for the Christians. The carved stone monolith to the memory of Mangkasa is of great interest as occurring amongst these tribes. The author alludes to many points of resemblance with Chins, Nagas, Garos and Mikirs, but many of the customs referred to are very widely spread and could be paralleled in Burma, Borneo, and occasionally in Madagascar.

It is perhaps a little unfortunate that the book in places inevitably recalls a Government Report, and it would have been more interesting and of more scientific value if the author had allowed himself to enunciate theories and make deductions. But it is full of important ethnological facts which should attract the attention not only of anthropologists, but of the general reader.

The Land that is Desolate. By Sir Frederick Treves, Bart., G.C.V.O., C.B., LL.D. London: Smith, Elder, and Co., 1912. *Price* 9*s. net.*

This last publication of Sir Frederick Treves is an account of a recent tour in Palestine, in which he and Lady Treves did not leave the beaten track; but the well-known story of what the devout, or, it may be, the merely curious, traveller has to find in the Holy Land is retold with all the verve and sparkle as well as the accuracy and directness, which characterises Sir Frederick's other works. He went to Palestine with no illusions and he found none there. It is a land not only desolate but steeped in sordid squalor and full of unabashed greed. Thanks to the ferocious iconoclasm of the Mohammedans on the one hand and the perverted zeal of Christians of all varieties of creed on the other, it is practically impossible now to fix down with anything like certainty the sites in the Holy Land of the scenes and incidents recorded in the Bible, and this, notwithstanding the learned and pious endeavours of such distinguished savants as Stanley, George Adam Smith, Conder, etc. The devout pilgrim is also grievously harassed both in mind and body by the people and conditions under which he strives to conjure up the occurrences of thousands of years ago. All this, and much more, is set forth in crisp and sparkling style by Sir Frederick, who is endowed with a happy sense of humour, which brings into prominence the comic aspect of things but never degenerates into irreverence. The sadder side of the story, such as is exemplified by the wailing of the Jews at the wall of the Temple, appeals to him powerfully, and evokes his genuine and profound sympathy. He is an adept at depicting the strange and varied scenery through which he passed, and he verifies it with apt illustrations from history. Altogether this is a delightful book, but it leaves on us the feeling, that Palestine is not only a land that is desolate, but one where the sacred and reverent impressions which are now a treasured possession would receive the severest shock and could hardly survive.

Troy: A Study in Homeric Geography. By Walter Leaf, Litt.D., Hon.D. Litt. (Oxon), Sometime Fellow of Trinity College, Cambridge. With Maps, Plans, and Illustrations. London: Macmillan and Co., Ltd., 1912. *Price* 12*s. net.*

"Overtaxed reviewers," says Dr. Leaf in the preface, "need hardly consider themselves bound to begin before page 310 or thereabouts, but should kindly read

as far as page 330; in this compass they will find the conclusions with which I am mainly concerned." A reviewer would require to be very overtaxed indeed, and besides be totally devoid of a taste for learning, who would not read the whole of this fascinating volume. The first four chapters are confessedly a synopsis of the standard work *Troja und Ilion* by the great scholar Dörpfeld, but a synopsis of great value and urgent necessity, since the German work is bulky, expensive, and without an index. It is also based on personal knowledge, for Dr. Leaf himself visited and carefully studied the Troad. We may take it therefore that the hill of Hissarlik is beyond question the site of the castle (it was never a city until Roman times) of Troy, and that the Trojan War as related in the *Iliad* actually took place. For details of the reasons which have led Dr. Leaf to this conclusion we must refer the reader to the book itself, but broadly stated they come to this, that from its geographical position Troy was a great emporium for goods from Thrace, the Euxine, and Asia Minor, that it held complete command of the Dardanelles, and that the growing commerce of the Greeks combined with the rise of their national spirit drove them to dispute this supremacy and by razing Troy to open the way direct to the markets and regions of supply.

Agamemnon, Odysseus, Achilles, and Priam may have been actual persons, the abduction of Helen may have really taken place, but whatever the immediate cause of the war may have been, the ultimate cause was economic, and was founded upon geographical conditions. The book is admirably produced. Maps, plans, and illustrations combine to elucidate as well as to adorn the text. Several appendices and an adequate index are invaluable for reference. Altogether the work is a credit to British scholarship and to the traditional method (derived from Scottish geologists we believe) of studying things on the ground.

The Little World of an Indian District Officer. By Robert Carstairs. London: Macmillan and Co., Limited, 1912. *Price* 8*s.* 6*d. net.*

It was the late Lord Ripon who remarked that, in India, when anything goes right or anything goes wrong, *e.g.* if there is a copious fall of rain, or if there is a drought, there are only two men blamed or praised, viz., the Governor-General and the District Officer. His Excellency was quite right in his remark so far as the three hundred millions of natives are concerned. For ninety-nine out of the hundred of them know little or nothing of the system under which they are governed, and without hesitation refer everything connected with their prosperity or adversity to the *ikbal*, *i.e.*, the auspices of the Governor-General, a distant, nebulous, but unquestionably supreme authority, but still more often to the *ikbal* of the District Officer, with whom they have more immediately to do. In our notice of Mr. Fraser's *India, under Curzon and After* (*S.G.M.*, vol. xxvii. p. 46), we pointed out, that that book gave the reader an excellent idea of the multifarious duties which fall to the lot of the Governor-General. In the interesting and instructive volume now before us our readers will find a compendious but fairly full account of the multifarious duties of a District Officer. For each and all of these the Government and the people hold the District Officer responsible; and Mr. Carstairs' object in writing this book is to set forth how he dealt with these duties in the various places where he was stationed during his Indian service. Here and there throughout the book there is a vein of disappointment, natural and inevitable to all officers of the enthusiastic temperament of Mr. Carstairs, who find their best thought-out schemes and projects ruthlessly nipped in the bud or coldly neglected at headquarters. Like most Anglo-Indian officers he has no complaints to make against the Lieutenant-Governor or the Governor-General.

It is the Secretariat that is the District Officer's *bête noire* in other provinces as well as Bengal. The Anglo-Indian civilian is often twitted with want of sympathy with the natives, an unjust taunt in most instances; and with regard to this Mr. Carstairs has some wise and shrewd remarks on the difficulties and dangers incidental to free and cordial intercourse between the official and the governed classes. There is, however, another and a much more bright and cheering side to this book, for Mr. Carstairs has to tell us of administrative experiments skilfully contrived and carried out for the amelioration of the conditions of the people, and improvements wisely initiated and successfully effected, often under very discouraging circumstances. The whole story is one of a strenuous, energetic, and conscientious career, chequered undoubtedly with disappointments, but eminently happy and successful. At a time when it is said that the career of the Indian civilian is not presenting to the youth of the United Kingdom the attractions it once had, the publication of this book is most opportune, for a perusal of it will show that nowhere in the length and breadth of the empire is there a career so full of opportunities of distinction and usefulness for an ambitious, earnest, and conscientious young man as there is in the Indian Civil Service of the present day.

The Progress and Arrest of Islam in Sumatra. By GOTTFRIED SIMON. London, Edinburgh, and New York: Marshall Brothers, Ltd., 1912. *Price* 6*s. net.*

The aggressive power of Islam has been manifesting itself in various parts of the world of late, and causing anxiety to those who are convinced of its baleful effect on heathen peoples. This is seen in Dr. Karl W. Kumm's note on "The Spread of Islam in Africa" in a recent issue of this magazine. In the Malaysian Archipelago, where Mohammedanism planted its foot six centuries ago, it was nowhere so successful as in Sumatra. The advent of the capture of the island by Holland, a Christian power, did not affect its activities, as it was allowed to pursue its way, the new Government using it for its own purposes. Of a population of four millions, it claimed three millions and a half among its converts. But Christian missions found their way to the island, and, in spite of the fanaticism Moslemism seems always to engender, they assuredly have won their most striking triumphs over Islam in that island. Mr. Gottfried Simon has spent eleven years in Sumatra, and has examined the situation as presented by the three faiths of the people, the Animistic, the Moslem, and the Christian, with great minuteness and care. He has canvassed the highest authorities on this subject, such as Snouck, Hurgronje, and Poensen. He presents the results of his study and observation in this work, under three divisions, in the first of which he deals with the factors in the progress of Islam in Sumatra, which he attributes to its active propagandism and neutrality of colonial governments. In the second division of the work the social and religious conditions of the Pagans who have become Mohammedans are dealt with, and here he seriously questions if the native has really advanced at all under the Islamic faith. In the third division, he shows what has been the outcome of the impact of Christianity on Islam, arresting it, and leading the people to a purer and fuller life. He holds that Islam does not affect the inward man; "he remains the same as ever he was, at best he becomes haughty, fanatical, and more indifferent to much other evil-doing which even his heathen conscience branded as sin," and that Islam "has not proved able really to raise the peoples of the Dutch East Indies." Christianity goes to the heart of man's failure, and supplies him with energy and strength of will to lift him to a higher life. The author shows a prolonged study of the situation, and a masterly

grasp of the questions involved. He has made a valuable contribution to this increasingly pressing problem of Islam and Christianity. His publication, however, sadly lacks two things—an index and a map. The latter is desirable, the former is indispensable.

AFRICA.

In the Shadow of the Bush. By P. Amaury Talbot, of the Nigerian Political Service. London: William Heinemann, 1912. *Price* 18*s. net.*

The Ekoi are a numerically insignificant tribe, springing from a Bantu stock, who now inhabit part of the Oban district of Nigeria and a slice of the German Cameroons adjacent to it. The whole Ekoi population both in British and German territory numbers only some 32,000, almost two-thirds of which live in British territory, into which there is a steady flow of immigration of Ekoi from the Cameroons. Mr. Talbot is the Deputy Commissioner of that part of Nigeria where the Ekoi dwell, and this highly interesting and beautifully illustrated work describes in simple and lucid style the manners, customs, religion, costumes, ceremonies, laws, etc. of this primitive and, as yet, unsophisticated race, gentle and kindly, but still steeped in superstition and not yet quite reclaimed from savagery. It is an excellent example of how Great Britain understands and fulfils the duty known as bearing the white man's burden, and how wisely and skilfully it adapts its form of government to local circumstances and conditions. The Ekoi people are practically allowed to govern themselves according to their own ideas of right and wrong, subject to the proviso that their courts shall do nothing contrary to the British sense of justice. In every town there is a council of elders which may be summoned by any one, even by a child. This council hears and decides all complaints. There is an appeal to a higher court consisting of picked representatives from other towns, and again there is a final appeal to the Commissioner.

A delightful feature of the book is an admirable and copious selection of amusing and quaint tales, mostly in the shape of folklore, by which the author has, so to speak, allowed the Ekoi to describe themselves at least in the infancy of their mental development. The numerous and quaint illustrations deserve special notice. The photographs of scenery are excellent, but even more remarkable and interesting are the photographs of individuals and incidents, illustrating the Ekoi religion, magic, domestic occurrences, costumes, etc.

Aux Sources du Nil. By Jules Leclercq. Paris: Plon-Nourrit et Cie, 1913. *Price* 4 *francs.*

The author travelled by the Uganda railway and the usual steamers on Lake Victoria. There is a full description of the usual incidents of the voyage (including the inevitable natives who dive and pick up money), of the Mombasa tramway, and of the carriages on the Uganda railway. His luggage was nearly carried off to Mombasa when he was changing steamers, and it is of such innocent adventures that the book is composed.

But the author makes statements which we cannot allow to pass unchallenged. Forced labour is not inflicted in Uganda simply to provide wood at a cheap rate for the railway. The natives are not oppressed, and are not discontented under British control. The book is full of carping criticism of everything British.

Moreover, some of the author's informants are not without a sense of humour

which is a little unkind, for there are some people with whom it is very unsafe to joke. Thus, "Et l'on éprouve un petit frisson à l'idée que c'est dans ces mêmes eaux que se tient le gigantesque serpent d'eau dont parlent avec terreur les riverains du Nyanza et qui est si peu, comme on l'a cru longtemps, un produit de leur imagination que le monstre vint un jour dérouler ses six mètres d'anneaux visqueux sur le pont du Winnifred (sic) dont le capitaine put le photographier."

We hope that this and other instances will prevent our French friends from taking this work as a serious account of Uganda.

British Somaliland. By Ralph E. Drake-Brockman, M.R.C.S.Eng., L.R.C.P. Lond., F.R.S., etc., etc. With 74 Illustrations from Photographs on art paper, other Illustrations, and a Map. London: Hurst and Blacket, Ltd., 1912. *Price* 12*s.* 6*d. net.*

This volume will undoubtedly take rank as a standard work on British Somaliland, its history, geography, ethnology, flora and fauna. After an account, going back to early Egyptian days, of its relations with the outside world, the author in four chapters describes the country as it is at present. The next three chapters are devoted to a careful study of the Somali race. Then the "Mad" Mullah comes under review, and the reader is given more than a glimpse of that remarkable man. Politics are not touched upon, except that the author gives his opinion that the abandonment of the whole interior was the only course open to the Government. Chapters follow on live stock, the outcast tribes, flora and fauna, and products of commercial value. Much interesting information is given as to the frankincense and myrrh and other characteristic exports. The illustrations are well chosen, while of the map we would only say that it imparts to the country a rather delusive appearance of being abundantly supplied with rivers.

Thinking Black. By D. Crawford, F.R.G.S. Pp. xii + 485. With Illustrations. London: Morgan and Scott, 1912. *Price* 7*s.* 6*d. net.*

The author, who is a pioneer missionary, spent, as shown by the second title of his book, "twenty-two years without a break in the long grass of Central Africa." He landed at Benquella in 1889, and after a long delay at the coast, started inland on a tedious and difficult journey more or less along the twelfth parallel of latitude to Bunkeya, the capital of King Mushidi. After a long residence, mostly without any European companion, in these terrible marshes, he again started eastward, and, crossing Lake Mweru, established a mission station on the further side. The cool resolution and patient endurance of the author can perhaps only be realised by those who know the conditions which prevailed in Central Africa at that time. He managed to make a friend of the brutal Mushidi, and seems to have kept on good terms with both Portuguese and Belgian officials, although he speaks plainly regarding San Thomé slavery and the cannibal soldiery of the Congo Free State.

The chief interest of the book consists in the exact but sometimes lurid picture of negro life as it was led under a native king when the Arab slave-traders were still in full activity, and before efficient European control was brought about. There is much that will attract every one in the author's luminous descriptions of the country, animal and plant life, and especially of the wily tortuous workings of the black man's mind. Indeed both geographers and anthropologists will find the general impression left by the author of real value, although he does not attempt accurate scientific detail. The photographs (some by Mr. Kidd) are quite delicious, and the four coloured sketches are excellent.

But the reader must not be put off by certain peculiarities of the book which ought to be pointed out. At the beginning of each chapter there are three or four little texts in red which seem unnecessary. In this "rubric" one finds, *e.g.* Jeremiah, Kipling, Mr. Punch, the author himself, and many others. It is also unfortunate that the author indulges in really atrocious puns and in too familiar quotations. There is, of course, always something new out of Africa, and there are at least three "curious tales." One refers to an elephant which seized the tail of a crocodile by its trunk, and threw it thirty yards away. Another is about the honey ratel which "has struck the idea of making his own distillery! This he does by digging a pot-like hole with his three middle claws on the wet bank of a river. Now he rams home the honey with a careful admixture of water, and off he goes to await the issue of the loyal law of fermentation. In two days or so, back he comes to find his alcohol foaming up out of the hole, and in a few minutes Mr. Badger is rolling drunk. The liquor swimming through his veins like a glorious fire makes him mad for murder." In fact the natives apparently told Mr. Crawford that one of his native boys was killed by an intoxicated honey ratel.

Twenty-five Years in Qua Iboe. By Robert L. M'Keown. London: Morgan and Scott, Ltd., 1912. *Price* 2*s.* 6*d.*

This little volume contains a pleasantly written account of the foundation, progress, struggles, and success of a missionary enterprise commenced in 1887, under the auspices of the Irish Presbyterian Church, in Southern Nigeria under circumstances which in many ways were most unpromising. The climate was deadly for Europeans; the inhabitants were sunk in barbarism and superstition and addicted to every sort of cruelty and vice; tribal war and slave-driving were universal. Out of this chaos, thanks to the patient devotion and strenuous exertions of the missionaries, there have been evolved peace, prosperity, and brotherly kindness. Such a story hardly lends itself to the pages of a scientific magazine, but we may say that the author has much to tell us of the primitive manners, customs, superstitions, and practices of the indigenous peoples living on both sides of the Qua Iboe river, and the book is a useful contribution to the anthropology of that region. It is written strictly from the missionary point of view, but not the less will it be found interesting and instructive to the general reader.

AMERICA.

South America: Observations and Impressions. By James Bryce. London: Macmillan and Co., Limited. New York: The Macmillan Company, 1912. *Price* 8*s.* 6*d. net.*

In this thoughtful and instructive volume we have a record of the observations made, and impressions received by Mr. Bryce, the well-known publicist, who was lately our Ambassador at Washington, during a four months' tour in South America, in which he travelled "through western and southern South America from Panama to Argentina and Brazil, via the Straits of Magellan," and visited seven of the republics. It is needless to say, that any such work coming from the pen of so distinguished a statesman will be universally received with a cordial welcome. If we look at it simply as a literary work, it charms by the purity, lucidity, and grace of its style and language, all of which we naturally expect in another work by the author of *The Holy Roman Empire.* But it has many

additional attractions. Of late years we have had many works, able, learned and practical, dealing with the history and conditions of several of the South American republics. But in this book we have a review of their condition as a whole, and as related to each other and to the outer world, profound, serious and discriminating, such as we can hope for only from an authority eminent as a historian, a jurist, a diplomat, and a statesman. The tour was brief, as Mr. Bryce himself points out, but, thanks to the courtesy and assistance he everywhere received, he had exceptional opportunities of seeing and appreciating the circumstances of the republics which he visited, and he was evidently familiar with their previous history. His survey then of South America is of peculiar value, more especially at this juncture when the great South American republics, having enjoyed a good spell of peace and prosperity, are preparing to take an honourable and important part in the affairs of the world. This work, welcome as it is on this side of the Atlantic, will probably receive greater attention in the United States, where, for example, the Monroe doctrine is still the acknowledged national policy. Mr. Bryce shows clearly, that however justifiable and suitable that doctrine once was, and even yet may be, for the smaller and less stable republics, it is now unsuitable, because unnecessary, for the great southern republics, where it is now generally resented and detested. This is only one example from a score of profound, intricate, and perplexing problems, political, racial, commercial, etc., connected with South America, which are calmly and impartially discussed by Mr. Bryce. For the general reader this book has many attractions. We have already mentioned the grace and lucidity of the style, and the interest and importance of its subject matter, and we may add, that the romance inseparably connected with such names as Pizarro, Bolivar, San Martin and Artigas, is freely used to adorn and enliven its pages.

The Spell of the Rockies. By Enos A. Mills. With Illustrations from Photographs by the Author. London: Constable and Co., 1912. *Price* 6*s. net.*

This book consists of a series of sketches mostly reprinted from various magazines published in the United States, and now presented in a very attractive volume, beautifully illustrated. The papers are not entirely devoted to the scenery of the Rockies, but are interspersed with interesting and instructive chapters on the denizens of the forest and streams. The chapter entitled "A Rainy Day" is, strange as it may seem, an eloquent appeal for afforestation, the benefits of which the author sets forth very clearly.

There is a breezy atmosphere about this collection of sketches which makes the book very readable, although of geography, in the strict sense it does not contain much.

AUSTRALASIA.

Papua or British New Guinea. By J. H. P. Murray, Lieutenant-Governor and Chief Judicial Officer, Papua. With an Introduction by Sir William MacGregor, G.C.M.G., C.B., D.Sc., LL.D. London: T. Fisher Unwin, 1912. *Price* 15*s. net.*

The story of the British occupation of Papua is one in which all concerned may feel legitimate pride. Never has the policy of "peaceful penetration" been more faithfully carried out, or the rights of the natives more scrupulously respected. This is largely owing to the outstanding qualifications of the various officials and lieutenant-governors responsible. This volume by the present lieutenant-governor gives a most complete account of Papua, its geography, history, ethnology,

administration, exploration, and development. Several most amusing tales are related illustrative of native modes of thought. There are many excellent photographs, but the map unfortunately does not give all the places mentioned in the book.

The Pagan Tribes of Borneo. By CHARLES HOSE, D.Sc., and WILLIAM M'DOUGALL, M.B., F.R.S. With an Appendix by A. C. HADDON, D.Sc., F.R.S. Two volumes. London: Macmillan, 1912. *Price* 42*s. net.*

In these two handsome volumes Dr. Hose summarises the experiences of twenty-one years spent in North Borneo, where he was formerly Divisional Resident and member of the Supreme Council of Sarawak. Dr. W. M'Dougall has also spent a year in Borneo, but only claims to have assisted in the preparation and "delivery" of the book.

This work should surely be in future the standard book of reference, not only on the anthropology of the island but on Bornean affairs generally. But it is far more than this, for the general reader will surely appreciate this vivid picture of the daily life and, up to a certain point, of the motives and beliefs of a very interesting group of aborigines.

We do not think that any one who even glances at this work can lay it down without looking at every illustration. These are not only supplied in generous proportion, but most of the 211 plates have an unusual charm which will appeal to every reader. It is impossible to describe artistic excellence, but we must especially mention the Kayan charging a sacrificed pig with a message to the god, the elderly Punan Headman, various young women of prepossessing appearance, and the plates dealing with the evolution of decorative design in textiles, wood-carving, and on the human skin.

The authors begin with chapters on the geography, history, ethnology, and the material condition of the Pagan tribes. The social system, agriculture, and ordinary daily life in the communal houses, on the rivers and in the jungles are then described with much detail. War, handicrafts, and especially decorative art are then dealt with; the latter subject is treated in full, and forms a valuable addition to the history of art, and is especially worth the attention of those who are interested in the evolution of conventional design. The second volume treats of the spiritual beliefs, of the soul, burial customs, animistic ideas, magic, myths, childhood rites, and the moral and intellectual peculiarities. There are also chapters on the nomad hunters, on the present Government, and especially one on the ethnology of Borneo. It is this last which forms probably the most important part of the book.

The problem of the origin of these races is exceedingly difficult to solve. Most of the tribes live in large communal houses on the banks of great rivers which, from their mountain sources to the sea, are almost everywhere bordered by dense tropical jungle. All, except the nomad hunters, cultivate rice to a greater or less extent, but every stage of culture seems to be represented, from the wandering hunter to the more advanced Sea Dayaks, who have usually a large surplus of rice to dispose of and who weave cloth and are great traders and boat-builders. There are resemblances due to environment, to similar stages of culture, and to borrowings of usages and superstitions. There have also been many invasions and immigrations.

The ethnology of these tribes is therefore exceedingly intricate. Dr. Hose has adopted and developed a suggestion made by Mr. J. R. Logan in 1850, and has succeeded in giving a simple and adequate explanation. He suggests that when

Borneo, Sumatra, and Java were still part of the mainland, they were inhabited by a race formed of two distinct elements, namely, a Caucasic or Aryan people from Bengal and the advanced guard of the Mongols from the north. When Borneo was separated from the mainland, this original Caucasic-Mongoloid stock was divided, and the various parts were subsequently isolated by further invasions from the north. One branch remained in Borneo; another, which contained pre-Dravidian as well as other Mongol elements, formed the Kayans, originally of the Irawadi basin, and, entering Borneo by the south coast rivers, began to penetrate up their valleys about seven hundred years ago. The Iban or Sea Dayaks are Proto-Malays from Sumatra who may have seized the river mouths not more than two hundred years ago when the Malays became, under Arab leaders, an aggressive power. Whilst in the present condition of ethnology one can only be thankful for this clear and attractive theory, there are certain points which require further investigation. The authors doubt if there ever were negritos in Borneo. But there are said to be cave drawings of black-skinned people of short stature with curly hair and very broad, flat noses. It seems doubtful if all this can be explained by the existence of a few African slaves. Then again Kayan "flaki," hawk, *may be* from the same root as "falco" or "falcon," and "aman" may be connected with "omen," but it requires courage to accept this derivation, even though the methods of divination by pig's livers and the flight of birds do resemble suspiciously those practised by the Romans. The practice of head-hunting has also, we think, a much wider distribution and an older history than the authors suspect. Dr. Haddon's Appendix contains the measurements, as made by himself, Dr. M'Dougall, Mr. R. Shelford, and includes some of the figures given by Niewenhuis and others.

The anthropological information is very full, but is very condensed. On page 326 the author states that of *seven* malohs, *three* are low brachycephalic, yet goes on to say the "cephalic index is essentially dolichocephalic."

GENERAL.

Voyages and Wanderings in Far-off Seas and Lands. By J. Inches Thomson. Illustrated. London: Headley Brothers, 1912. *Price 3s. 6d. net.*

As the title indicates this is an account of journeys and adventures in many parts of the world. Among the author's adventures was included shipwreck on Macquarie Island, where he and a party spent four months before they were taken off. The book also includes many tales of the South Sea Islands in the earlier days when "blackbirding" was practised. It is illustrated by some good photographs, and gives an interesting picture of the seaman's life fifty or so years ago.

The Story of Jerusalem. By Col. Sir C. M. Watson, K.C.M.S., C.B., M.A.
The Story of Santiago de Compostela. By C. Gasquoine Hartley (Mrs. Wallis M. Gallichan). (Mediæval Town Series.) London: J. M. Dent and Co., 1912. *Price 4s. 6d. each net.*

These two books treat their respective subjects from a somewhat different point of view. In the case of Santiago Mrs. Hartley gives first a general account of Galicia—the background of her city,—then devotes three chapters to its history, and gives most of the rest of the book to a detailed account of the architecture of the city, with a final chapter of general information for the visitor. The book will thus serve as a good introduction to the charms of Galicia, the chapter entitled "The Way to Santiago" giving some account of the province. Sir Charles Watson's book is almost purely historical, and the earlier chapters contain an

oddly uncritical summary of the statements of Josephus and of the books of the Old Testament. Even the narratives of the books of Kings and Chronicles are merely quoted, without comment, as though the Higher Criticism had never been. This complete neglect of the work of the critics means, as it seems to us, a great loss to the book. Further, as surely no visitor to Jerusalem would omit to put a Bible in his box, it seems a little needless to summarise its historical portions. In the final chapter some description is given of present-day Jerusalem for the use of the tourist.

La Sismologie Moderne: Les Tremblements de Terre. Par le Comte de Montessus de Ballore. Paris: Armand Colin, 1911. *Prix* 4 *fr.*

This is an excellent and well-illustrated little book whose object is to give a general account of earthquakes and the associated phenomena, in language sufficiently simple to be understood by the non-specialist. The author is the director of the Seismological Service of the Republic of Chili, and is thus a seismologist by profession, already known by his larger and more technical works on the same subject. His book should prove of great use to the geographer.

BOOKS RECEIVED.

Marlborough's Travellers Practical Manual of Conversation in Four Languages: English, French, German, and Italian. Third Edition. Revised. Pp. 144. London: E. Marlborough and Co., 1912. *Price* 1*s.* 6*d.*

Notre France d'Extrême Orient. Par le Duc de Montpensier. Préface de M. Le Myre de Vilers. Ouvrage orné de 18 Gravures d'après les Photographies de l'auteur. Cr. 8vo. Pp. iii + 348. Paris: Perrin et Cie. *Prix* 5 *fr.*

Half-Hours in the Levant: Personal Impressions of Cities and Peoples of the Near East. By Archibald B. Spens. With 32 Illustrations in Half-tone on Art Paper. Cr. 8vo. Pp. 107. London: Stanley Paul and Co., 1913. *Price* 1*s. net.*

Asia: A Geography Reader. By Ellsworth Huntington, Assistant Professor of Geography in Yale University. With an Introduction by Richard E. Dodge, Professor of Geography, Teachers' College, Columbia University. Cr. 8vo. Pp. xxvi + 344. Chicago: Rand, M'Nally and Co., 1913.

An Elementary Historical Geography of the British Isles. By M. S. Elliott, M.A. Containing 60 Illustrations, Maps, and Views. Cr. 8vo. Pp. x + 172. London: A. and C. Black, 1913.

American History and its Geographic Conditions. By Ellen Churchill Semple. With Maps. Demy 8vo. Pp. viii + 466. London: Constable and Co., Ltd., 1913. *Price* 12*s.* 6*d. net.*

The Duab of Turkestan: A Physiographic Sketch and Account of Some Travels. By W. Rickmer Rickmers. 4to. Pp. xvi + 564. Cambridge: University Press, 1913. *Price* 30*s. net.*

The Republic of Chile: A popular description of the Country; its People, and its Customs. By David W. Caddick. Cr. 8vo. Pp. 64. London: A. H. Stockwell, 1913. *Price* 1*s. net.*

Ordnance Survey Maps; Their Meaning and Use. With Descriptions of Typical Sheets. By Marion I. Newbigin, D.Sc. (Lond.). Cr. 8vo. Pp. 126. Edinburgh: W. and A. K. Johnston, 1913. *Price* 1*s. net.*

Rambles in Holland. By Edwin and Marion Sharpe Grew. Illustrated. Cr. 8vo. Pp. xii + 339. London: Mills and Boon, Ltd., 1913. *Price* 6*s.*

Cambridge County Geographies :—

Middlesex. By G. F. Rosworth. Pp. x + 166.

Radnorshire. By Lewis Davis. Pp. x + 156.

Rutland. By G. Philips. Pp. vii + 171.

With Maps, Diagrams and Illustrations. Crown 8vo. Cambridge : University Press, 1912. *Price* 1*s.* 6*d. net.*

The Syrian Goddess : Being a Translation of Lucian's "De Dea Syria," with a Life of Lucian. By Professor Herbert A. Strong, M.A., LL.D. Edited with Notes and an Introduction by John Garstang, M.A., D.Sc. With Illustrations. Cr. 8vo. Pp. xiv + 111. London : Constable and Co., Ltd., 1913. *Price* 4*s. net.*

Les Deux Congo. Par Baron Jehan de Witte. Un volume in-16 avec gravures et cartes. Pp. xii + 408. Paris : Plon-Nourrit et Cie, 1913. *Price* 4 *fr.*

Eastern Bolivia : Description of its General Features and Resources. By Dr. Guillermo Velasco. Demy 8vo. Pp. 20. London, 1912.

The Lord Wardens of the Marches of England and Scotland : Being a brief History of the Marches, the laws of March, and the Marchmen, together with some account of the ancient feud between England and Scotland. By Howard Pease, M.A., F.S.A. Royal 8vo. Pp. xvi + 255. London : Constable and Co. Ltd., 1913. *Price* 10*s.* 6*d. net.*

A Wayfarer in China : Impressions of a Trip across West China and Mongolia. By Elizabeth Kendall. With Illustrations. Demy 8vo. Pp. xiv + 338. London : Constable and Co., Ltd. *Price* 10*s.* 6*d. net.*

Mexico and Her People of To-day : An Account of the Customs, Characteristics, Amusements, History and Advancement of the Mexicans, and the Development and Resources of their Country. By Nevin O. Winter. Illustrated from photographs. Demy 8vo. Pp. viii + 492. London : Cassell and Co., 1913. *Price* 7*s.* 6*d.*

Indian Pages and Pictures : Rajputana, Sikkim, The Punjab and Kashmir. By Michael M. Shoemaker. With 63 Illustrations. Crown 8vo. Pp. xxii + 475. London : G. P. Putnam's Sons, 1912. *Price* 10*s.* 6*d. net.*

Philip's Geo-Graph Book : A Geographical Observation Note-Book for Climatic, Astronomical, and other Records. By J. H. Hack, M.A., Part I. London : George Philip and Son, 1913. *Price* 3*d. net.*

Vascular Plants of West Greenland. Between 71° and 73° N. Lat. By Morten P. Porsild. Royal 8vo. Pp. 38. Kφbenhavn : Bianes Lunos Bogtrykkeri, 1912.

Wissenschaftliche Ergebnisse der Expedition Filchner nach China und Tibet 1903-1905. Von Dr. Wilhelm Filchner. Demy 8vo. Berlin : Mittler und Sohn, 1913. Band IV. Pp. viii + 148. *Preis* 10 *m.* Band V., Bilder. *Preis* 20 *m.*

A Practical and Experimental Geography. By Frederick Morrow, B.A., F.R.G.S., and Ernest Lambert, L.C.P. With 112 Maps and Diagrams and 254 Exercises. Cr. 8vo. Pp. xiv + 239. London : Meiklejohn and Son, 1913. *Price* 2*s.* 6*d. net.*

Ancient Babylonia. By C. H. W. Johns, Litt.D. Cr. 8vo. Pp. vii + 148. Cambridge : University Press, 1913. *Price* 1*s. net.*

The Earth : Its Shape, Size, Weight, and Spin. By J. H. Poynting, Sc.D., F.R.S. Cr. 8vo. Pp. 141. Cambridge University Press, 1913. *Price* 1*s. net.*

The Atmosphere. By A. J. Barry, M.A. Cr. 8vo. Pp. 146. Cambridge : University Press, 1913. *Price* 1*s. net.*

Official Year-Book of the Scientific and Learned Societies. Compiled from Official Sources. Twenty-ninth Annual Issue. Demy 8vo. Pp. vi + 373. Griffin and Co., Ltd., 1912. *Price* 7*s.* 6*d.*

The People of the Polar North. By Knud Rasmussen. Compiled from the

Danish Originals, and edited by G. Herring. Illustrations by Count Harold Moltke. Royal 8vo. Pp. xi + 358. London: Kegan Paul, Trench, Trübner and Co., Ltd., 1908. *Price* 21*s. net.*

Panama and What it Means. By John Foster Fraser. With a Map and 48 Plates from Photographs. Cr. 8vo. Pp. ix + 291. London: Cassell and Co., Ltd., 1913. *Price* 6*s.*

Adventures in the Alps. By Archibald Campbell Knowles. Illustrated. Cr. 8vo. Pp. xii + 176. London: Skeffington and Son, 1913. *Price* 3*s.* 6*d. net.*

Reminiscences of a South African Pioneer. By William Charles Scally. With 16 Illustrations. Demy 8vo. Pp. 320. London: T. Fisher Unwin, 1913. *Price* 10*s.* 6*d. net.*

The Life of Philibert Commerson, D.M., Naturaliste Du Roi: An Old World Story of French Travel and Science in the Days of Linnæus. By the late Captain S. Pasfield Oliver, R.A., and edited by G. F. Scott Elliot, F.L.S., F.R.G.S. With Illustrations. Demy 8vo. Pp. xvi + 242. London: J. Murray, 1909. *Price* 10*s.* 6*d. net.* *Presented by G. F. Scott Elliot*, F.L.S., F.R.G.S.

What I saw in Russia. By the Hon. Maurice Baring. Foolscap 8vo. Pp. vii + 381. London: T. Nelson and Sons, 1913. *Price* 1*s.*

A Guide for Laboratory Geography Teaching. By O. D. Von Engeln, Ph.D. For use in connection with a *Laboratory Manual of Physical and Commercial Geography.* By the late Prof. R. S. Tarr and O. D. Von Engeln, Ph.D. Crown 4to. Pp. 20. New York: Macmillan and Co., 1913. *Price* 1*s.*

Diplomatic and Consular Reports.—Trade of Paraguay (5040; Trade of Vladivostock (5041).

Statistical Abstract relating to British India from 1901-2 to 1910-11. London, 1913.

Publishers forwarding books for review will greatly oblige by marking the price *in clear figures, especially in the case of foreign books.*

NEW MAPS.

EUROPE.

ORDNANCE SURVEY OF SCOTLAND.—The following publications were issued from 1st to 31st January 1913:—

Six-inch and Larger Scale Maps.—Six-inch Maps (Revised). Quarter Sheets, with contours in blue. Price 1s. each. *Lanarkshire.*—23 SW., 54 NE.

1 : 2500 Scale Maps (Revised), with houses stippled, and with areas. Price 3s. each. *Lanarkshire.*—Sheets vi. 6; vii. 7. *Renfrewshire.*—Sheets vii. 7, 9; viii. 5; xi. 2, 6, 9; xii. 12. Sheet xiii. 1. Price 1s. 6d.

Note.—There are no coloured editions of these Sheets, and the unrevised impressions have been withdrawn from sale.

Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 2s. 6d. each. *Caithness*—Sheets v. 11 SW.: xxv. 1 SE.; 5 SE.; 6 NW., SW. *Dumbartonshire.*—Sheets xvii. 6 NW., SW. *Fifeshire.*—Sheets xxxv. 8 NW., SE. *Forfarshire.*—Sheets liv. 7 NW.; 8 NW., NE., SW., SE. *Perthshire.*—Sheets lxiv. 9 SE.; lxxiv. 13 NW. *Renfrewshire.*—Sheets viii. 11 NE., SE.; xi. 2 NE.; 8 NE., SW.; xii. 2 NW., SE.; 3 NW.; 4 NW., SW., SE.; 6 NW., NE., SW.; 15 SW.; xiii. 9 NE., SE.; 13 NW., NE.; 14 NW.; xvii. 2 SE. *Stirlingshire.*—Sheets xxv. 9 SW., SE.

The following publications were issued from 1st to 28th February 1913:—

One-inch and Smaller Scale Maps.—One-inch Map. Third Edition; printed

in colours and folded in cover, or flat in sheets. Sheets 83, 93. Price, on paper, 1s. 6d.; mounted on linen, 2s.; mounted in sections, 2s. 6d. each.

Six-inch and Larger Scale Maps. Six-inch Maps (Revised). Quarter Sheets, with contours in blue. Price 1s. each. *Lanarkshire.*—19 SE.

1 : 2500 Scale Maps (Revised), with houses stippled, and with areas. Price 3s. each. *Lanarkshire.*—Sheets I. 13; II. 9; V. 12 (v. 16 and x*a*. 4); VI. 2, 3, 5, 7, 9, 10, 11, 13, 14; X. 1, 2, 3, 4, 6, 7, 8; XI. 5. Sheet V. 7. Price 1s. 6d. *Lanarkshire (Glasgow and its Environs).*—Sheet X. 5. *Renfrewshire.*—Sheets II. 12; VI. 8; VII. 1, 5, 8, 10; VIII. 10, 15, 16; XI. 3, 13; XII. 6, 7, 8, 15; XIII. 5, 9, 13, 14. Sheet XIII. 15. Price 1s. 6d.

Note.—There are no coloured editions of these Sheets, and the unrevised impressions have been withdrawn from sale.

Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 2s. 6d. each. *Aberdeenshire.*—Sheets LIV. 4 SW., SE. *Dumbartonshire.*—Sheet XXIII. 13 SE. *Fifeshire.*—Sheets I. 14 NE., SW.; IV. 1 NE., SW., SE.; XVI. 14 SW., SE.; XX. 2 NW.; XXII. 8 SE.; XXIII. 2 NW., NE.; 5 SW.; XXXV. 14 NW.; XL. 6 SE.; 10 NE. *Forfarshire.*—Sheet LIV. 7 NE. *Haddingtonshire.*—Sheets X. 2 SE.; 6 NW. *Peeblesshire.*—Sheets XIII. 6 NW., NE., SW., SE. *Perthshire.*—Sheets LXIII. 3 SE.; LXXIV. 13 SW. *Renfrewshire.*—Sheets II. 11 NW., NE., SE.; 12 SW.; VII. 5 NW., NE., SE.; VIII. 7 NE., SE.; 8 SW., SE.; 11 NW., SW.; 12 NW., NE.; XI. 4 NE.; 7 NW., NE., SE.; 8 NW.; 13 SW.; XII. 2 NE., SW.; 3 SW.; 4 NE.; 6 SE.; 15 NW., NE., SE.; XIII. 13 SE.; 14 NE., SW.; XVI. 3 NW., NE.; XVII. 2 NW., NE.; 6 NE. *Ross and Cromarty.*—Sheets XLI. 4 SE.; 8 NE. *Roxburghshire.*—Sheets X. 1 SW.; XXI. 5 NE., SE.; XXV. 3 SW., SE.; 4 NW., SW.; 7 NW., NE., SW., SE. *Selkirkshire.*—Sheets VIII. 1 NE., SE.; 6 NW., NE.; XII. 1 SW., SE.; 5 NW., NE., SW., SE.

ADMIRALTY CHART, SCOTLAND.—West Coast. Sheet IV. Ardnamurchan to Summer Isles, including the Inner Channel and part of the Minch. New Edition, January 1913. Number 2475. Price 3s.

Admiralty Office, London.

FORTH AND TAY.—Bathy-orographical Wall Map. Scale 1 : 126,720, or two miles to an inch. Constructed and engraved by W. and A. K. Johnston, Ltd. Price 12s., mounted on cloth, rollers, and varnished.

W. and A. K. Johnston, Ltd., London and Edinburgh.

This is an effective map of Eastern Central Scotland, drawn on a large enough scale to show the physical and political features with admirable clearness. It ought to prove of great value in teaching local geography.

AFRICA.

SIERRA LEONE.—Scale 1 : 250,000, or about 4 miles to an inch. Sheets—Ronietta, Panguma, Sherbro. 1912. Price 1s. 6d. net each sheet.

Geographical Section, General Staff, London.

EAST AFRICAN PROTECTORATE.—Scale 1 : 250,000, or about 4 miles to an inch. Sheet—Kenya. 1912. Price 1s. 6d. net.

Geographical Section, General Staff, London.

SOUTH AFRICA.—The Standard Commercial and Educational Map of the Union of South Africa and Southern Rhodesia, specially compiled for the Standard Publishing Co. of South Africa. 1913. Scale 1 : 2,500,000, or about 40 miles to an inch. With Index to towns.

John Bartholomew and Co., Edinburgh.

This new map gives the country from the Cape to the Zambesi with as much detail as the scale will permit. It is compiled from the latest surveys, and shows all new railways up to date. There are inset maps giving the environs of the principal towns.

AMERICA.

ONTARIO.—Topographic Map. Scale 1 : 63,360, or 1 mile to an inch. Sheet XXXIII.—Hamilton. Sheet XLV.—Romney. (Department of Militia and Defence.) Price 2s. net each sheet. 1912.
Geographical Section, General Staff, London.

ONTARIO AND QUEBEC.—Scale 1 : 126,720, or 2 miles to an inch. Cornwall Sheet. 1912. *Price 2s.* *Geographical Section, General Staff, London.*

PANAMA CANAL.—*Daily Mail* Chart. A Sheet of Maps and Diagrams. Price 1s. net. *George Philip and Son, Ltd., London.*

In this useful Sheet are comprised a Plan of the Canal, a Bird's Eye View, a Map of the Isthmus, Diagrams showing Comparison with other Ship Canals, a World Map showing new Routes, a Comparative Table of Routes, and Plans of Culebra Cut and Gatun Dam.

NEW ATLASES, ETC.

PHYSICAL AND POLITICAL SCHOOL ATLAS. By J. G. Bartholomew, LL.D., F.R.G.S. Demy 4to. 1913. Price 1s. net.
Oxford University Press, London.

This new school atlas shows political features on a physical basis. It consists of 32 plates of coloured maps and 16 plates of uncoloured maps and diagrams. The maps are clear and legible and the colouring is effective.

PHILIPS' VISUAL CONTOUR ATLAS.—49 Maps and Diagrams. With Index. Price 6d. net. *George Philip and Son, Ltd., London.*

A series of maps prepared to meet the want of a sixpenny elementary atlas. It embodies the latest educational requirements and is well adapted for elementary teaching.

ATLAS OF THE WORLD.—By J. Bartholomew, F.R.G.S. Price 6d. net.
T. C. and E. C. Jack, London and Edinburgh.

Designed as a reference atlas for the series entitled "The People's Books," this little volume contains 56 pages of coloured maps illustrating the general geography of the world at the present day.

BASE MAPS.—Prepared by Professor Paul Goode. A series of 32 outline maps. In two sizes, 8 × 10 in. and 15 × 10 in. Prices 1 cent and 3 cents each.
The University of Chicago Press, Chicago.

These maps are admirably adapted for the purpose for which they are designed. They are clear, free from detail, and printed on tough paper suitable for pen and coloured work.

TERRESTRIAL GLOBE.—Philips' Panama Canal Route Globe. Six inches diameter. Price 2s. 6d. net. *George Philip and Son, Ltd., London.*

This little globe enables one, as nothing else could, to realise the world-wide changes in international routes which will be brought about by the opening of the Panama Canal.

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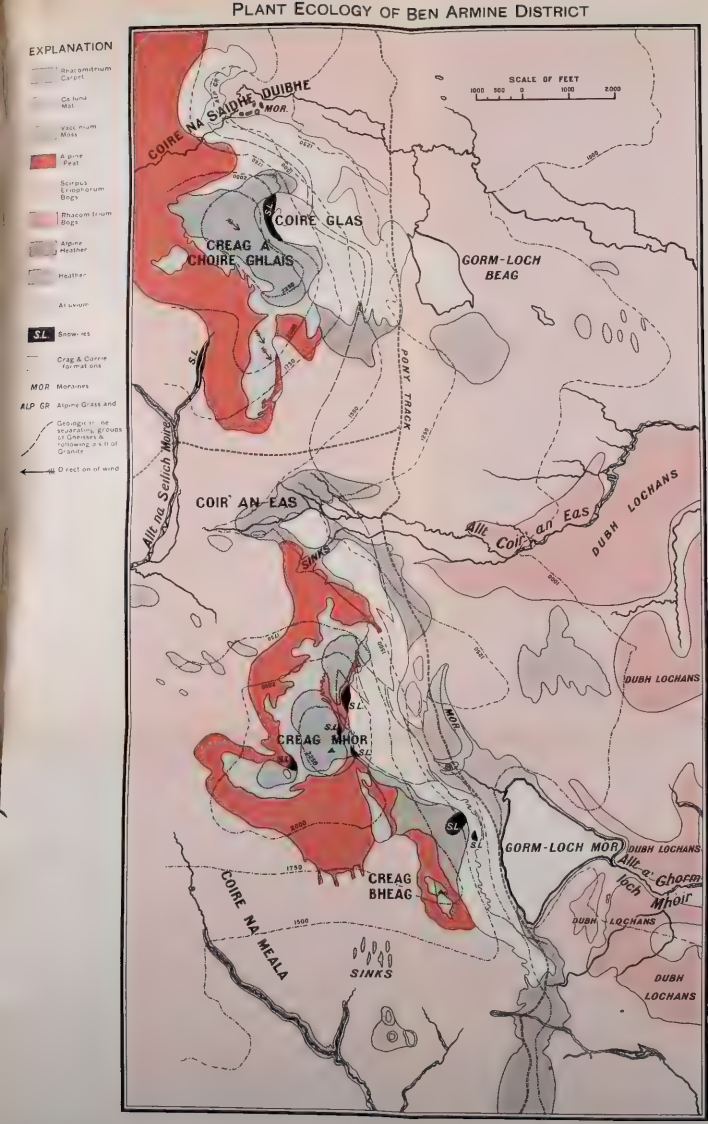

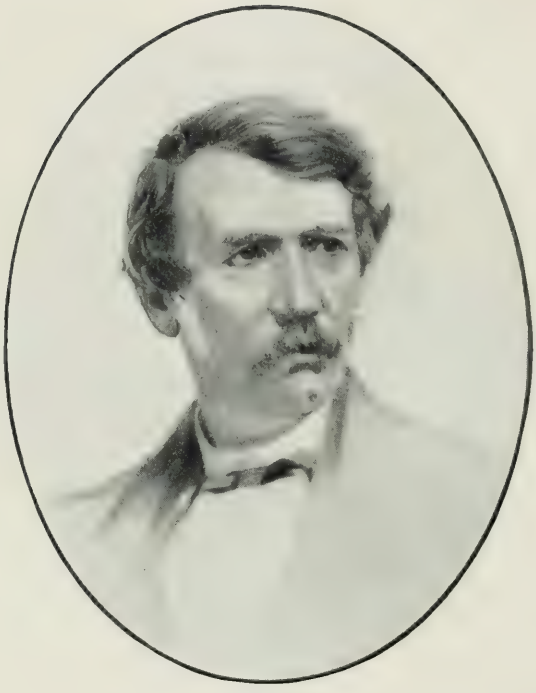

DAVID LIVINGSTONE, 1813-1873

THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

LIVINGSTONE AS AN EXPLORER: AN APPRECIATION.

By J. W. GREGORY, D.Sc., F.R.S.,
Professor of Geology in the University of Glasgow.

(With Maps.)

AT the dawn of the nineteenth century European ignorance of the interior of Africa was at its nadir. In the sixteenth and seventeenth centuries Portuguese missionaries and travellers had penetrated far inland, and their observations were supplemented by information collected from Arab traders. The maps compiled by European cartographers from the Portuguese reports were full of information about the geography of Central Africa. Thus the map published by Sanson of Abbeville in 1635 truly represented tropical Africa as a land rich in rivers and lakes: Tanganyika, the Victoria and Albert Nyanzas, Lakes Rudolf, Moero and Chad, can all be recognised.[2] Hence, in spite of their blunders, these seventeenth-century maps contain so many of the main facts of Central African geography that they must have been based on actual observation.

But the men who had made these discoveries were not trained explorers; they kept no regular journals: they made no astronomical observations to determine their positions: and on their return they could only spin such yarns as those on which Defoe, in 1720, founded his story of Captain Singleton's journey across Africa. As European geographers became more critical and scientific, and as these Portuguese pioneers were gradually forgotten, the knowledge they had gathered

[1] Delivered in the University of Glasgow on the occasion of the Centenary of David Livingstone, 18th March 1913, and published here in slightly abbreviated form.

[2] The chief errors in this map are that Tanganyika, "Zaire Lacus," is united with Nyasa, "Zembre Lacus"; that Tanganyika is given an outlet to the Nile as well as to the Congo; and that the rivers in various parts of the map are represented anastomosing like those of low alluvial plains.

was either lost or dismissed as fabulous. The lakes, rivers, goldfields, mountains and Portuguese stations were omitted from the maps, and the interior of tropical Africa was represented as one vast uninhabitable desert: there remained two fabulous mountain chains, "the Mountains of the Moon" on the north and the "Spine of the World" ("the Mountains of Lupata") on the east.

The maps of the interior of Africa issued between 1800 and 1850 contained less information and were less accurate regarding the interior of Africa than those of the sixteenth century. By the end of the nineteenth century the map of Africa had been again filled in; the deserts had been reduced to their true proportions; every important river had been tracked from source to sea: the highest mountains had been climbed: steamers were plying on the lakes and rivers: railways were superseding the slow and costly caravans of porters; and instead of only the Portuguese, Dutch and Turks holding extensive possessions in Africa, almost the whole continent had been partitioned between seven European states.

This revolution in the condition of Africa was mainly due to the great Scottish explorer whose memory we are assembled to honour.

David Livingstone's world-influencing achievements were the result of his own personal efforts and character. He had no social advantages, and his influence was due to his dogged persistence, utter fearlessness,[1] noble ambition, and his genius for travel. For he left school at the age of ten to begin work in the Blantyre cotton mills: and his education was continued at a night school after the day's mill-work was done. At the age of nineteen he was promoted to the grade of cotton spinner; he then earned enough in the summer, with some help from his brothers, to support himself, during the winter, as a student at this University and at Anderson's College.

That he was a student at the University has been denied; but his own testimony is conclusive. He referred in a letter to Murchison, printed in the *Journal of the Royal Geographical Society* (vol. xxvii. 1857, p. 386), to the encouragement he had received from "my former instructors in Glasgow University." In a speech[2] at the University Union in 1858, he told the students that "I remember well when I was among you," and he reminded them that "When Sir Robert Peel addressed us here in 1837, he told us that it was not genius that ensured success but hard, earnest working." Livingstone, therefore, attended that address as one of the Lord Rector's constituents, and he was clearly then a student of the University. Hence, on the evidence of Livingstone's statements, apart from the abundant testimony of his friends,[3] he was a son of this University.

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[1] His superb courage was one of his most striking personal characteristics.

[2] For reference to the report of this speech, in the *Glasgow Herald* of 26th February 1858, I am indebted to Mr. E. G. Hawke.

[3] *E.g.* Prof. Adam Sedgwick, in his introduction to *Livingstone's Cambridge Lectures*, said that Livingstone had attended three courses of Lectures at the University of Glasgow, 1860, p. 55. The reference to Sir D. K. Sandford on p. 16 of the *Missionary Travels* supports the tradition that Livingstone attended the Greek class at the University.

We may also reflect with pleasure that the University of Glasgow was the first to recognise Livingstone's geographical work: for in 1854, while he was making his journey across Africa, the University conferred on him, "free of cost," the honorary degree of LL.D., "in high appreciation of his services in the cause of science and Christian philanthropy." Letters announcing this fact on his arrival on the east coast were especially welcome and contrasted strangely with a communication from the Missionary Society which he received at the same place.[1]

Livingstone's father was a deacon of the Congregational Church at Hamilton, and when he resolved to become a missionary, he naturally offered his services to the London Missionary Society, and was one of the many illustrious men whom the Congregational denomination sent into the mission-field. He was provisionally accepted and went to London in 1838. He was never a fluent public speaker, and narrowly escaped rejection: but after an extension of his period on probation he was accepted and continued his medical studies at Charing Cross Hospital. He returned to Glasgow in November 1840, to pass his final examination and receive his medical diploma: and he sailed the following month for South Africa. It was symptomatic of Livingstone's interests that during the three months' voyage to the Cape he learnt from the captain of the ship how to determine geographical positions: and this training, combined with subsequent instruction from Maclear, the Government Astronomer at Cape Town, enabled Livingstone to fix his routes with the precision of an experienced navigator.

Livingstone arrived at the Cape during a critical time in South African history. There, the ideal of the missionary party was to develop the country as a group of native states ruled by native chiefs, who were to be guided by missionary advisers—states, in fact, like Madagascar before its conquest by France.

The Reform Bill of 1832 had placed political power in the hands of the aggressive philanthropists: and under their influence the British Government adopted a policy in South Africa, which events, and the almost unanimous verdict of historians, have emphatically condemned. The Dutch farmers at the Cape found their position intolerable: and they sought freedom by emigration to the north of the British territories. There they proclaimed a free republic. The feelings of these emigrants towards the missionaries can be judged from one article of the constitution which was adopted by the Boers at Winburg on 6th June 1837: for it decreed that no man should join the republic unless he would take an oath to have no connection with the London Missionary Society or with any of its agents.

The success of a free Boer state to the north of the Cape would have been fatal to the missionary policy; so the British Government was persuaded to establish a chain of native states across South Africa, extending from Natal to the deserts north of the Orange River. This chain of states was completed in 1844. But the scheme proved a fiasco:

[1] Livingstone forgave but could never forget this letter, which probably helped his severance from Congregationalism.

the native states collapsed, and in 1852 the British Government acknowledged the independence of the South African Republic.

Livingstone arrived in South Africa at the time when the effort to establish missionary supremacy to the north of the Cape was being actively pursued; and he was sent to Bechuanaland to help the development of the northern outposts. He went at first to Lattakoo, or Kuruman, the most northern of the mission stations, then under the charge of the famous missionary Robert Moffat, whose daughter Livingstone married in 1844.

From 1841 to 1849 Livingstone was engaged in mission work on the south-eastern border of the Kalahari Desert in the district to the north of Mafeking. The history of this period of Livingstone's career has never been adequately written. His relations with many of his fellow-missionaries were not always harmonious. Livingstone had more practical insight than many of his colleagues, and he expressed his opinions of them and of the results of missionary enterprise in South Africa with ruthless candour.[1] Owing to the smallness of the native population, he was disappointed with the field which the London Missionary Society was then tending so diligently.

Livingstone had meanwhile abandoned medical work, a course which seems to have been partly due to his dialectic defeat on the question of rain-making. He endeavoured to convince the people of their folly in trying to make rain; he insisted that there was no visible connection between their medicines and the clouds; the natives replied that there was none between his medicines and the diseases they were given to cure: he argued that as their medicines often failed, the rain that sometimes fell after their use was not due to them; they retaliated that his medicines sometimes failed, yet he attributed to them whatever good results followed; and they concluded that as he persevered with his medicines, although his patients sometimes died, there was no reason why they should cease using theirs, because their methods were not always successful. Livingstone recognised that he had lost the argument, and gave up medical practice, except on special occasions, so that it might not hamper his spiritual work.[2]

In 1848 Livingstone settled at Kolobeng, the village of a chief Sechele, who was converted next year. After Sechele's abandonment of polygamy, Livingstone baptized him, amid his weeping people, who were terrified at the loss of their best rain-maker. With deplorable ill-fortune, the year following the country was stricken with so severe a drought,

[1] For example, the letter published in Sir H. H. Johnston's *Livingstone*, 1891, pp. 64-69. In an unpublished letter (now in the British Museum, No. 36525 f. 9), written from Tette in 1856 to his colleague, Rev. J. Moore, Livingstone remarked, "The natives too behaved liberally to us except when we came near to this. We Christians have not given the heathen fair play with our glorious Christianity. They believed my statements of all my goods being expended until we came into the vicinity of the Christians. It is not so only among R. Catholic Christians but everywhere. I often feel my own share of the guilt to be great."

[2] Thus he wrote to Cecil, his tutor at Ongar: "I did not at first intend to give up all attention to medicine and the treatment of disease, but now I feel it to be my duty to have as little to do with it as possible. I shall attend to none but severe cases in future, and my reasons for this determination are, I think, good."

that the men had to scatter far and wide to hunt, while the women and children tried to avert starvation by collecting locusts,[1] and later on Kolobeng had to be removed owing to the failure of water.

While Livingstone had been gradually growing less satisfied with his mission-field, the fascination of the unknown land beside him had captivated his mind. Livingstone was one of the idealists described in Kipling's lines:

> "We were dreamers, dreaming greatly, in the man-stifled town;
> We yearned beyond the sky-line, where the strange roads go down."

The fine imagination which changed the mill-hand at Blantyre into the missionary to the Bechuanas was leading Livingstone to another change in his career. He daily looked out into the wild waste of the Kalahari and yearned to follow the strange roads that went down into it, in the hope that they might lead to a better watered, more fertile, more populous country, where missionary work might be more profitable than among the small poverty-stricken tribes hemmed in between the Boers and the desert.

In the year of his worst troubles at Kolobeng his chance came. Two famous hunters, Cotton Oswell and Murray, visited his station and made the offer that, if Livingstone would find guides across the desert to the lake reported to exist on the other side, they would pay the expenses of the expedition. The evidence is contradictory as to who proposed this journey. According to the magazine of the London Missionary Society, Livingstone was afforded an opportunity for his "long-cherished purpose, by the visit of two benevolent travellers, Messrs. Murray and Oswell, who requested his co-operation in attempting to cross the Desert and exploring the unknown regions to the north. This overture Mr. Livingstone gladly embraced, unintimidated by the hardships or dangers of the undertaking."[2]

The party left Kolobeng on the 1st June, and after a journey of two months reached Lake Ngami on 1st August 1849. The country around the lake proved malarial and unpromising, but the rivers that discharged into it indicated the existence of higher and therefore probably more salubrious land to the north. The travellers endeavoured to reach this better land, but they were stopped by a large river. They resolved to try again; so Oswell went to the Cape to buy a boat, while Livingstone awaited him at Kolobeng.

This journey to Lake Ngami settled Livingstone's future. It com-

[1] Livingstone notes in his journal, with characteristic resignation, the local failure of the rains and their continuance in adjacent districts.

[2] *Miss. Mag. and Chron.*, vol. xiv., 1850, p. 34. This version is supported by Sir Samuel Baker, Sir Francis Galton, and the correspondence published in the *Life of Oswell*. According to Livingstone, he proposed the expedition and Murray and Oswell came from England to be present at the discovery (*Miss. Mag. and Chron.*, vol. xiv., 1850, pp. 35-37). Oswell appears certainly entitled to more credit in connection with this expedition than he has generally received. He seems to have deliberately effaced his share in the undertaking, as he knew that the reputation would be far more useful to his friend than it could be to himself. He sacrificed geographical fame, but gained an enduring reputation for chivalrous generosity.

pleted his conversion from a missionary into an explorer, a change which had been in progress throughout his residence in South Africa. Livingstone never again settled down to live on a mission-station. He wrote to his Directors: "I hope to be permitted to work, so long as I live, beyond other men's line of things, and plant the seed of the Gospel where others have not planted."[1] Livingstone had enlisted for life in that pioneer regiment whose mission is

> To "preach in advance of the Army,"
> To "skirmish ahead of the Church."

Livingstone heard at Lake Ngami of people who had come from the west coast and were probably Portuguese, and he saw there a coat which, he remarks, "we believe to be of Portuguese manufacture." It seemed probable that there was a practicable route from Lake Ngami to the west coast: and Livingstone was confirmed in this conclusion shortly after his return to Kolobeng by some envoys who brought him an invitation to visit Sebituane,[2] the famous chief of the Makololo. Some of this party had been to the west coast, and they described to Livingstone how they had seen ships there, "and called out to them, 'Hey, come and tell us the news.'" a request to which these indifferent ships paid no attention.

Livingstone was delighted to accept this invitation. His convert, Sechele, purchased a wagon, and together they started off on this journey into the unknown north. The effort failed, but it was renewed next year with Oswell, who had come back from the Cape, and it was then successful. Livingstone and Oswell reached Sebituane, who gave them a most friendly reception—but died a few days after their arrival. He was succeeded by his daughter, who subsequently resigned the chieftainship to her brother Sekeletu.

Sebituane had invited Livingstone because he needed the help of a British traveller, and he could not have made a better selection. Linyanti, his capital, was situated on the Chobe River, near its junction with the Zambesi, in a district equidistant from the eastern and western coasts. The country abounded in elephants, that were killed by the bold native hunters, and Sebituane wished to establish commercial relations for the sale of his ivory with the towns on the west coast. The road southward to the Cape skirted the Kalahari desert, and was always difficult and sometimes closed by war. The route to the east coast was also precarious, for impis of rebellious Zulu had settled in positions which commanded the lower Zambesi. Some slave traders from Benguella had recently visited Sebituane and exchanged guns for slaves, and as the way to the west coast was therefore practicable Sebituane wanted to use it independently of the Portuguese traders.

The scheme was delayed by Sebituane's death and Livingstone's preliminary arrangements. In order to send his wife and children to

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[1] *Miss. Mag. and Chron.*, vol. xiv., 1850, p. 36.

[2] The spelling of most of the personal and place names is that adopted by Livingstone in his two chief books.

England, he returned with them to Cape Town, where he found that he had overdrawn his salary, and a further advance was refused. From this strait he was relieved by the wealthy and generous Oswell, who was fortunately then at the Cape. Livingstone returned northward to find that his house at Kolobeng had been destroyed by a party of Boers, who had also attacked and burned the adjacent native settlement. Livingstone wrote an indignant protest and predicted the extermination of the natives unless the Boers were controlled: and Sechele went to Cape Town to demand redress. Neither of them gained any satisfaction from the British officials, who were no longer in political co-operation with the missionaries: according to Dr. Moffat, the authorities at Cape Town paid Sechele "no attention, nor would even regard his tale of woe."[1]

Sir George Cathcart, the Governor and High Commissioner at the Cape, thought the incident only what Livingstone might have expected, and what Sechele deserved. He declared, in reference to Livingstone, "that the losses and inconveniences sustained do not amount to more than the ordinary occurrences incidental to a state of war, or to which those who live in remote regions beyond Her Majesty's dominions must be frequently liable."[2]

Livingstone reported that he found the tribes in the interior "just as anxious to have a path to the seaboard as I was to open a communication with the interior."[3] Hence he had little trouble in persuading Sekeletu, the new chief of the Makololo, to adopt his father's policy. Sekeletu fitted out a caravan, provided ivory for the expenses in Angola, and sent instructions throughout his extensive sphere of influence that the travellers were not to feel hungry. Livingstone left Linyanti on the 11th November 1853, and travelling to the north of the route used by the Portuguese traders, he arrived at Loanda on the 31st May 1854. He was received with the greatest kindness by the Portuguese authorities. "The Portugese have been amazingly kind," he wrote of them.[4]

After a residence of some months at Loanda, in a house which is now in ruins, but which the Governor-General has arranged shall be marked with a memorial tablet, he left on 20th September for Linyanti. Not contented with the great feat of having crossed from the middle of the continent to the Atlantic, he resolved to continue down the Zambesi valley to the east coast. The chief provided him with a still larger escort and fresh supplies, and thus re-equipped, Livingstone left Linyanti on 3rd November 1855, and reached Quilimane on the east coast on 22nd May 1856. He was thus the first white man, other than Portuguese traders, to cross tropical Africa from shore to shore.

The previous trans-African journeys of the Portuguese have been often ignored or discredited; but they may be fully admitted without detracting from Livingstone's merit. The evidence appears conclusive that Portuguese and Portuguese half-castes had occasionally crossed from the Portuguese

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[1] *Miss. Mag. and Chron.*, vol. xviii., 1854, p. 75.

[2] "Further Correspondence Relative to the State of the Orange River Territory," *Parl. Pap.*, 1854, vol. xliii., p. 5.

[3] *Proc. R. Geog. Soc.*, vol. ii. 1858, p. 126.

[4] *Miss. Mag. and Chron.*, vol. xx., 1856, p. 196.

West African to their East African colonies. This journey was made both ways at the beginning of the nineteenth century by two men, P. J. Baptista and A. José Francisco, who were probably half-castes.[1]

Livingstone returned home and was rightly welcomed as a national hero, for his long journey, with its chain of well-fixed positions, is generally regarded as the most important contribution to the geography of tropical Africa that has ever been made. The feat was all the more magnificent as it was achieved by help enlisted from a negro chief. It showed that both Africa and its people had been unjustly maligned. The power of one man to persuade a Central African chief to equip so great an expedition aroused high hopes of what might be done in Africa by adequate use of native help.

Public opinion was well guided in its estimate of Livingstone's work by leading geographical experts. Sir Roderick Murchison, then president of the Royal Geographical Society, proclaimed the greatness of Livingstone's achievements. The Geographical Society gave the traveller his first public welcome. Livingstone gratefully dedicated his *Missionary Travels* to Murchison,[2] whose death he deplored as the loss of the truest friend he had ever had. Sir Thomas Maclear, the Government Astronomer of the Cape, testified to the unusual accuracy with which Livingstone had determined his positions. Honours and honorary degrees were showered upon him. It was soon recognised that he was not only in the front rank of explorers, but that he had the practical insight of a statesman, and was animated by lofty philanthropic ambitions. He was appointed British Consul for the East African coast, and "the independent districts in the interior," and went back to East Africa as head of a well-equipped Government expedition.

The master idea of all the later part of his life was the suppression of the slave-trade by the introduction of European commerce and colonisation.

That the object of the Zambesi expedition was mainly geographical

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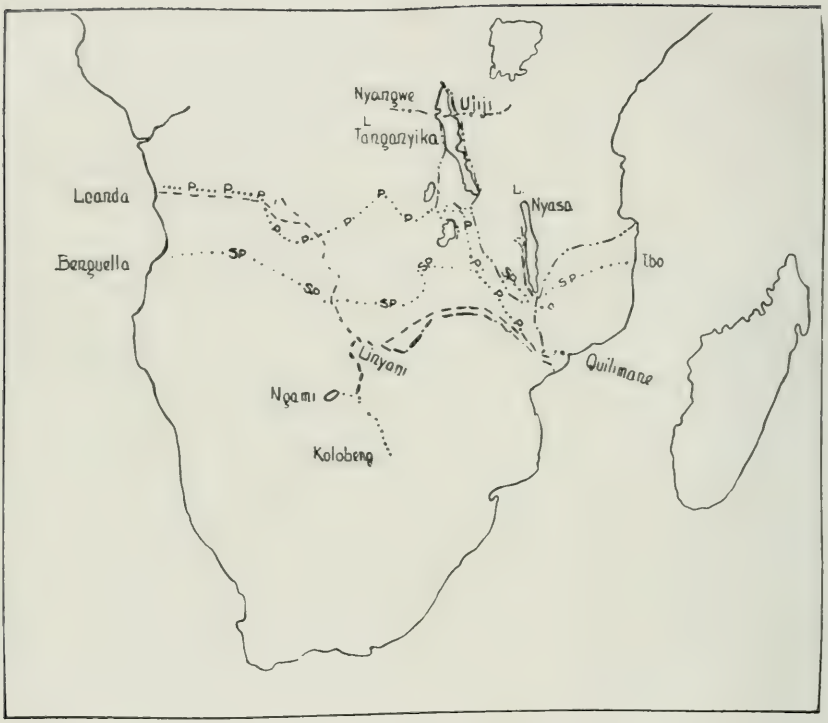
[1] These "Pombeiros" have been generally described as blacks and as slaves, but this view is not borne out by the documents connected with the expedition. The term Pombeiros is rendered as "bondsmen" by Beadle, who translated Baptista's journal for the volume issued by the Royal Geographical Society under the title *The Lands of Cazembe* (London, 1873, pp. vii., 271, and map). The Pombeiros are referred to as "home born slaves" in the list of contents to that work. The men were probably half-castes. They do not appear to have been ordinary slaves. Thus the Governor of Sena, in his letter in reference to this journey, speaks of slaves having journeyed to Cazembe; but he refers to the two Pombeiros as "persons," and twice refers to them as "explorers." He remarks, "I do not find a large amount of intelligence in these explorers: but, at the same time, I admit that, according to their capabilities, they did a great deal."

The style of Baptista's journal resembles that of an illiterate European rather than that of a negro. He constantly refers to "blacks" in a way which shows that he certainly did not regard himself as a black. He and his companions are referred to in the journal as white men. Thus on their introduction to the chief Cazembe, the guide said, "I bring you some white men here" (p. 187). Again (p. 211) some people at a farm answered, "it was very fortunate to see white people, whom they call Muzungos, coming from Angola" (Muzungu, plural Wazungu, is the Suahili word for European. See *e.g.* Krapf, *Suahili Dictionary*, 1882, p. 271).

[2] He wished to dedicate also to Murchison his book on the Zambesi expedition.

THE MAP OF AFRICA IN 1828.

(Hotland, *Africa Described.*)



SKETCH-MAP OF LIVINGSTONE'S MAIN ROUTES OF EXPLORATION.

. . . . . Expedition to Ngami.
– – – – – – Trans-African Expedition.
– · – · – · Zambesi Expedition.
– · · – · · – Last Expedition.
. . P . . . . P . . . . Approximate route of the Pombeiros, 1802-1811.
. . . . . SP . . . . . Reported route of Silva Porto, 1853-1854.

has been clearly stated in the beginning of Livingstone's book upon its work.[1] The mission appealed to him, for he trusted that it might strike a great blow at the slave-trade throughout the world. He was convinced from the excellent results of the Portuguese administration in West Africa, where he described the slave-trade as practically dead, that, if the Africans were allowed to develop their keen instincts for trade, slavery would prove unprofitable and would collapse. He believed that the Lower Zambesi contained the best cotton-growing land in the world. "I think," he wrote, "the most important part of the discoveries I was privileged to make is, that there is an immense extent of country where sugar and cotton might be cultivated."[2] Livingstone believed the country could be so developed as to grow all the cotton and sugar required by the British markets, and thus render them independent of the slave-grown products of America. Slavery on both sides of the Atlantic might be slain with one blow.

The expedition, with its official position, ample funds, and large expert staff, appeared to give Livingstone the chance of his life. Its geographical results, though important, were less striking than those from his two other main journeys. Livingstone was away on this expedition from 1858 to 1864, and during that time surveyed the course of the Zambesi from the Victoria Falls to the sea; he explored its tributary the Shire, discovered Lake Shirwa, and marched up the western coast of Lake Nyasa nearly to its northern end.[3] The most important discovery was that the region around Lake Nyasa has a dense population, a fertile soil, large tracts of healthy highlands, and is near extensive coalfields. The work of the expedition thus led to the foundation of the British Protectorate of Nyasaland. The botanical collections made by Sir John Kirk, the medical officer of the expedition, were a most valuable contribution to African botany. In spite of all these results, the expedition was generally judged a comparative failure. Murchison expressed the current view by remarking in a letter to Livingstone, "the little success attending your last mission."[3]

Success in the main object of the expedition was, however, at the time impossible. Its work was hampered by three difficulties. The boat, the *Ma-Robert*, which had been especially built for the expedition, proved a failure. Livingstone denounced its builder as a worse thief than any of the Africans who had robbed him; but as the boat was

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[1] "The main object of the Zambesi expedition, as our instructions from Her Majesty's Government explicitly stated, was to extend the knowledge already attained of the geography and mineral and agricultural resources of Eastern and Central Africa—to improve our acquaintance with the inhabitants, and to endeavour to engage them to apply themselves to industrial pursuits and to the cultivation of their lands, with a view to the production of raw material to be exported to England in return for British manufactures; and it was hoped, that, by encouraging the natives to occupy themselves in the development of the resources of the country, a considerable advance might be made towards the extinction of the slave-trade, as they would not be long in discovering that the former would eventually be a more certain source of profit than the latter" (*Expedition to Zambesi*, 1865, p. 9).

[2] *Proc. R. Geog. Soc.*, vol. ii., 1858, p. 58.

[3] See map, p. 248.

[4] Blaikie, *Personal Life of Livingstone*, p. 297.

passed by the Admiralty, it was probably well built, and Murchison expressly exonerated the builder from blame. The trouble apparently came from overloading a boat which had been designed to have a draft of sixteen inches till it drew two and a half feet. No wonder it was slow and leaky.[1] Livingstone, at his own expense, replaced the *Asthmatic*, as he nicknamed the first boat, by the *Lady Nyasa*. It was built in sections for portage past the Murchison Falls to Lake Nyasa; but before it could be used there the expedition was recalled. He sailed the *Lady Nyasa* to Bombay, where she was sold; and, with his usual financial ill-luck, he placed the money in a bank which failed, and he lost it all.

The second trouble was the despatch in 1861 of a Church of England mission in the wake of the expedition. Murchison strenuously objected to this proceeding, for there was ample room elsewhere in Africa for missionary enterprise; and he pointed out that the establishment of a Protestant mission, in territory claimed by Portugal, must lead to trouble between the expedition and the Portuguese.[2] Livingstone, however, welcomed the mission, and was deeply disappointed at its failure, for which he blamed the bishop in charge.

Murchison's objections proved only too well justified, and Livingstone became involved in a bitter feud with the Portuguese. He still referred with sympathy to their administration of Angola, but he denounced that in East Africa with characteristic vehemence. As the British Government recognised that it was impossible for a British mission to suppress the slave-trade, in an area that was isolated from the coast by a wide tract of Portuguese territory, the expedition was recalled. The justice of this decision was sadly admitted by Livingstone.

On Livingstone's return home he suffered a second period of lionisation; from this he escaped in August 1865, when he left England on the expedition that lasted till his death in 1873. Its object was clearly and repeatedly explained by Murchison. It was to determine between the view that Tanganyika was the source of the Nile as held by Beke, Findlay, and Burton, and the contrary view indicated on Speke's earlier map. Livingstone inclined from the first to believe that Tanganyika discharged to the Nile.

Though Livingstone retained his official position as British Consul, he did so without salary or claim to pension. Most of the expense of this expedition he contributed himself or obtained from personal friends. The largest donation, £1000, was contributed by his devoted Glasgow friend, James Young, founder of the Scottish oil industry.

Livingstone often declared that he would only go to Africa as a missionary. In the introduction to his book on the Zambesi Expedition, Livingstone has clearly explained the scope of his investigations during the trans-African journey described in his *Missionary Travels*. "In

[1] This overloading appears to have been first due to the officer in charge of the boat, whom Livingstone described as his "naval donkey" (*Life of Oswell*, vol. ii. p. 59).

[2] The Prince Consort's refusal to become patron of the Universities' Mission may have been due to the same view.

our exploration the chief object in view was not to discover objects of nine days' wonder, to gaze and be gazed at by barbarians: but to note the climate, the natural productions, the local diseases, the natives, and their relation to the rest of the world." Since that journey his geographical interests had been steadily growing: and his diary during his last expedition shows that he had become intensely interested in the problem of the Nile, and was anxious to crown his African career by settling that most prolonged of geographical controversies. "The object of my expedition," he wrote to his son Tom, in explanation of his last journey, "is the discovery of the sources of the Nile."[1] He also welcomed the mission owing to its new opportunities for furthering his schemes of African development: and owing to his quarrel with the Portuguese he was glad to explore a new road into the interior north of their dominions, and yet south of the region where an arid belt intervenes between the coast and the fertile interior. The last six years of the expedition was devoted exclusively to the Nile problem.

The zone of Africa north of the Zambesi is geographically more interesting than the country to the south; but the conditions of travel there are more difficult and annoying. Large tracts of South Africa were occupied by comparatively organised tribes. A traveller who had secured the friendship of a leading chief could explore safely far and wide under his authority; but north of the Zambesi there were no great chiefs. The country was occupied by small, independent tribes, who maintained perpetual blood feuds, so that inter-tribal intercourse was restricted. Travel was precarious, and in some districts impossible except to large and well-armed caravans. The natives were ignorant of the power of the white man. They had had no experience of punitive expeditions, and the massacre of a caravan usually secured rich loot and no punishment. For the conditions of travel south of the Zambesi, Livingstone was ideally suited; but in the region of his last expedition his very virtues told against him. He was bored by the continual wrangles with village elders, and in his later years he appears to have been too kind-hearted, or perhaps too indolent, to discipline his caravan.

The geographical results of Livingstone's last and longest expedition were most important, but the story how its great discoveries were made, is one of the most pathetic in the annals of African exploration.

On the Zambesi expedition Livingstone's relations with his European comrades had not been happy, so this time he wisely went alone. He started with a caravan of fifty-seven men and boys; he trusted for transport to camels and buffaloes, as he hoped that they would resist tsetse disease. His drivers were a party of sepoys, who soon lost heart, and tried to secure the return of the expedition by killing the transport animals. Livingstone, in his journal and still more in private letters, complained of these men's brutality. He said he had to hurry on ahead of the caravan so that he might not hear the groans of his baggage animals. Some of them, he says, were deliberately beaten to death, and others died through the torturing of their wounds. His experiment in

[1] Blaikie, *Personal Life of Livingstone*, p. 332.

transport had, therefore, no chance of success. The beasts of burden were soon dead and the men out of control.

The expedition began by the ascent of the Rovuma River, across what is now German East Africa. Livingstone's most direct route to his special field of work would have been past the northern end of Lake Nyasa and thence to Tanganyika along the route followed by the Stevenson road; but Livingstone was gradually pressed southward by the timidity of his men. He passed around the southern end of Lake Nyasa and began the exploration of what is now north-eastern Rhodesia.

Shortly after leaving Lake Nyasa the sepoys deserted in a body; and to excuse their return and secure their pay, they told a dramatic story of how Livingstone had been killed in a fight, after he had heroically slain several of his opponents. The two most competent authorities at Zanzibar, Dr. Seward, the Consul, and Sir John Kirk, the Vice-Consul, believed the men's story, which was also accepted by Sir Samuel Baker. It was scouted by Murchison and Oswell, and finally disproved by a search party under Young, which, though it failed to reach Livingstone, obtained conclusive evidence that he was alive after the date of his reported murder.

After the desertion of the sepoys Livingstone met some Arab traders, and the happiest part of the expedition was during his journeys with them. Livingstone wrote from Bangweolo (8th July 1868), "The Arabs have all been overflowing in kindness."[1] He had lost his stores and had only a few men left. The Arabs at once supplied him with provisions, cloth and beads; and "showed," said Livingstone, "the greatest kindness and anxiety for my safety and success."[2]

Livingstone still loathed the slave-trade, but he had come to recognise that a certain measure of domestic slavery was inevitable in that stage of African development; and he drew pleasing pictures of the kindly relations between his Arab friends and their slaves. "I was glad," he wrote, "to see the mode of ivory and slave trading of these men, it formed such a perfect contrast to that of the ruffians from Kilwa, and to the ways of the atrocious Portuguese from Tette."[3] At Nyangwe, however, he again saw the full horrors of the slave-trade.

Livingstone's work during this part of the expedition disproved the supposed connection between Lakes Tanganyika and Nyasa: he discovered Lakes Bangweolo and Moero, and evidence which convinced him that the rivers of that district were the head streams of the Nile. "I have found what I believe to be the sources of the Nile between 10° and 12° S.," he wrote joyfully home.[4] In one of his waking dreams he speculated as to the possibility of Lake Moero being the Meroe where, according to ancient tradition, Moses lived for some time with his Egyptian foster-mother, the Princess Merr.[5]

In a journey westward from Tanganyika, he reached the Lualaba River at Nyangwe, and from its vast volume feared that it might be the head stream of the Congo, as Stanley afterwards proved to be the case.

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[1] *Proc. R. Geog. Soc.*, vol. xiv., 1870, p. 8. [2] *Ibid.* p. 10. [3] *Ibid.* p. 10.
[4] *Ibid.* p. 8. [5] *Last Journals*, vol. ii. p. 59.

Any water that flowed to the Congo had no interest for Livingstone. In one entry in his journal, he described himself as "oppressed with the apprehension that after all it may turn out that I have been following the Congo: and who would risk being put into a cannibal pot, and converted into black man for it."[1] He clung tenaciously to the idea that the Lualaba discharged to the Nile, and in a letter to Oswell, written in October 1869, said: "there can be little doubt that such is its destination." He wrote to Murchison: "the sources of the Nile are undoubtedly between 10° and 12° S."[2]

He was, however, unable to trace the Lualaba northward in order to determine whither it flowed. He returned to Ujiji, where, to his bitter disappointment, he found that his stores had been sold by an Arab. Another of the Ujiji Arabs at once called on him with the offer to sell some ivory and replace the stolen goods. Livingstone temporarily declined this generous offer, and a few days later his wants were relieved by the arrival of H. M. Stanley.

Livingstone's long stay to the west of the lakes had naturally occasioned great anxiety at home, for it had been thought that the expedition need not spend more than a year in the field, and the contribution from the Geographical Society had been given on that estimate. The news of the death of his transport animals, and the desertion of his sepoy escort, revealed his difficulties and danger, and repeated rumours of his death reached the coast.

After his long absence, and the failure to obtain news of him, Mr. Gordon Bennett of the *New York Herald* sent Stanley to find the lost explorer. The authorities regarded the quest as hopeless. Stanley reached East Africa in 1871, when Livingstone had a five years' start, and it was thought by some of his friends that he would certainly cross Africa to the west coast. But Stanley's pursuit was swift: he crashed through every obstacle which could not be avoided. He left his two European comrades buried beside his path, and after a rapid march of five months found Livingstone at Ujiji, the Arab settlement on the eastern shore of Tanganyika.

Stanley was then a young and adventurous journalist, and appears to have had no special interest in Livingstone, or sympathy with geographical research. Stanley found a man surprisingly unlike his expectations. The two men must have been extraordinarily different in original disposition, and Livingstone's thirty years' residence in Africa had left its mark on his temperament. In spite of his many trials there, he doubtless much preferred life in Africa to that in Europe. Sir Francis Galton, in explanation of Livingstone's long absence, remarked that "there was no ground for crediting Livingstone with any excessive home-sickness. He was as much at home in Africa as in England; . . . therefore, when he received his supplies, if he had more work to do, no doubt he would remain."[3] But in spite of Stanley's first disappointment with Livingstone, he gradually fell under his influence during their four

[1] *Last Journals*, vol. ii. p. 188.
[2] *Proc. R. Geog. Soc.*, vol. xiv., 1870, p. 12.
[3] *Ibid.* vol. xv., 1871, p. 209.

months' residence together. Livingstone was anxious to determine whether the river at the northern end of Tanganyika flowed into the lake or out of it, for, according to the Royal Geographical Society, that was "the great object of Livingstone's journey."[1] The Arabs who had seen the river said it flowed into the lake. Livingstone expected it to flow out of the lake. Stanley probably thought the difference immaterial, but that if Livingstone really wished to know he might as well satisfy this whim. So he made the necessary arrangements to visit the locality, and invited Livingstone to go as his guest. They found the Arabs were right; but the journey settled far more than that question.

Around the camp fires at night, Livingstone told Stanley the story of his life and wanderings, and explained his theories of the Central African river system. He seems to have laid in Stanley's mind the germ of the belief that knowledge is worth something for its own sake alone. Stanley, having supplied Livingstone's immediate needs, returned to the coast, and sent him back ample supplies, with a caravan of carefully selected and thoroughly reliable Zanzibari. Thus re-equipped, Livingstone started west again in 1872. He travelled slowly, for his usual deliberation was increased by growing weakness. He struggled on to Lake Bangweolo, where he died between the 1st and 4th of May 1873. To prove his death, the men embalmed the body, and, after many difficulties, carried it back to the coast, and it was buried in Westminster Abbey.

The geographical results of this long expedition were most important. Though they did not conclusively settle the problem which Livingstone had started to solve, they showed that Tanganyika had no northern outlet, and was not connected with Lake Nyasa. The freshness of the water of Tanganyika indicated that it had an outlet somewhere, which was subsequently found by Stanley. Livingstone proved that the river known as the Chambesi was not, as had been thought from its name, a tributary of the Zambesi, but that it flowed through Lake Bangweolo and thence discharged northward: but whether the northward-flowing rivers to the west of Tanganyika joined the Congo, or whether, as Livingstone both thought and hoped, they were tributaries of the Nile, was not settled until Stanley's epoch-making expedition, described in *Through the Dark Continent*. Nevertheless, Livingstone's exploration of the region to the south and west of Lake Tanganyika was a contribution of fundamental importance to African geography.

In the above attempt to summarise Livingstone's thirty years' geographical work in Africa in less than thirty minutes it has been only possible to refer to the general outline of his travels. His results were so great that Livingstone is universally accepted as one of the world's greatest explorers.

His fame rests mainly on the first of his three chief expeditions, owing to the great extent of new country it explored, the unexpected nature and practical value of its discoveries, and its achievement at the cost of a native chieftain. Sir Roderick Murchison proclaimed this

[1] *Proc. R. Geog. Soc.*, vol. xi., 1867, p. 144.

journey as "the greatest triumph in geographical research which has been effected in our times."

The outstanding features of Livingstone's explorations were the great length of his new routes and the precision with which he determined his positions. He travelled about 29,000 miles in Africa, and traversed so much new ground that, to quote the authoritative opinion of Dr. Scott Keltie, "no single explorer ever did as much for African geography as Livingstone." "No explorer on record has determined his path with the precision you have accomplished," wrote Sir Thomas Maclear to Livingstone.

The accuracy of his work may be shown by comparison of some of the positions he determined in Angola with those adopted by the official Portuguese map of the area published in 1910; his results, as shown by the following list, are extraordinarily accurate, considering the conditions under which he worked.

		Portuguese Map, 1910.
Katema's, near Lake Dilolo.	11° 35′ 49″ S.	11° 20′ S.
	22° 27′ E.	22° 2′ E.
Golungo Alto. . . .	9° 8′ 30″ S.	9° 4′ S.
Ambaca, ...	9° 16′ 35″ S.	9° 14′ S.
Probably, .	15° 23′ E.	15° 12′ E.
Pungo Andongo. . .	9° 42′ 14″ S.	9° 40′ S.
	15° 30′ E.	15° 34′ E.

His first journey, with its chain of accurately determined stations, gave the first reliable section across tropical Africa, and represents the greatest single contribution to African geography which has ever been made. His account of the country was a revelation to European geographers. The Kalahari had been regarded as part of a vast desert, which was believed to occupy the whole interior of Southern Africa, and had been called the Southern Sahara, from the belief that it corresponded in size to the Sahara of Northern Africa. Livingstone's discovery that southern tropical Africa was watered by large rivers, contained many great lakes, and a fertile soil which grew excellent cotton, sugar, indigo, and other tropical produce, and that its inhabitants were keen traders, expert agriculturists, and skilled craftsmen, was a discovery as momentous as it was unexpected.

Livingstone therefore discovered that southern tropical Africa, instead of being a useless desert, is a land of incalculable commercial possibilities. Europe was given an interest in Africa, which has never ceased to grow; Livingstone was thus the most influential pioneer in opening tropical Africa to civilising influences.

Livingstone's views as to the geographical structure of Equatorial Africa were of less merit than his practical achievements: but his lack of training in geography is responsible for any deficiencies in his theoretical conclusions. He represented Africa as a plateau bordered by two mountain chains which run north and south and are separated by a great central depression. This view had been advocated by Murchison in 1852, and Livingstone independently arrived at the same conclusion; and as a simple generalised statement of the structure of southern

tropical Africa it is essentially correct.[1] Sometimes, however, probably under Murchison's influence, Livingstone overestimated the depth and importance of the central depression, and imagined that it had been filled by one vast fresh-water sea, which had been drained by the formation of cracks through the mountain ranges on each side. The gorge of the Zambesi below the Victoria Falls, one of his most famous discoveries, he regarded as the most conspicuous of these cracks. The existence of this sea has not been confirmed, and the gorges on the margins of the plateau were doubtless cut by the rivers that flow through them.[2]

In some of the statements of his theory Livingstone represented Africa as consisting of a low, malarial plain, enclosed by a rim of mountains which he described as "perfect sanatoria." Such a conception of the structure of Africa is only partially true. But Livingstone clearly recognised that Equatorial Africa is essentially an ancient plateau, of which the jagged sides look from below like mountain ranges. His account of the descent from the eastern plateau of Angola to the western coast shows that he understood its real geographical structure ;[3] and his conclusion : "The continent seems to be an elevated tableland sloping chiefly towards the east" was quite correct for the zone he was describing.

Livingstone's views as to the structure of Africa were a great advance on the ideas of most of his contemporaries. Thus the *Encyclopædia Metropolitana*, in its article on Africa, in 1845, adopted a classification of African mountains which was very crude in comparison with Livingstone's explanation of their nature ; and it described as the most striking feature of Africa, "the immensity of its deserts." In addition to the Sahara, it says (p. 195), the continent is "everywhere intersected with deserts of an inferior, but still of great extent ; and these are to be found even in the southern parts, towards the European settlements. There is, probably, a wide wilderness of this nature, between the east and west ranges of mountains, pervaded by the race of people called Jagas, who sometimes are said to wander into the vicinity of the Cape."

Regarding the sources of the Nile, the problem to which Livingstone devoted the last six years of his life, his theoretical conclusions were less correct than those on the structure of the continent. The facts that he discovered during his last expedition would, no doubt, have led him to recognise, if he had been spared to write a connected summary of his results, that his view was practically impossible. But while in the field he was under the conviction, which almost amounted to an obsession, that he was extending southward the basin of the Nile. This view was probably a reaction from the supposed former limitation

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[1] According to Dr. Scott Keltie, in the article on Livingstone in the last edition of the *Encyclopædia Britannica*, vol. xvi., 1911, p. 841, "The conclusions he came to have been essentially confirmed by subsequent observations"

[2] The formation of the gorge by the cutting back of the Victoria Falls has been proved by Mr. G. W. Lamplugh (*Quart. Journ. Geol. Soc.*, vol. lxiii., 1907, pp. 162-214).

[3] The essential accuracy of Livingstone's interpretation of the mountains of Angola I had the pleasure of confirming last summer by a journey along a parallel line to the south of his route.

of the Nile to the mountains north of the Equator; Speke's work had extended the Nile basin south-eastward by the inclusion of the Victoria Nyanza, and Livingstone hoped to extend it still further south and south-westward to include the basin of Tanganyika. When his visit with Stanley disproved the supposed northern outlet from Tanganyika to the Albert Nyanza, he clung to the hope that the waters on the highlands west of Tanganyika flowed north-eastward into the Nile; and he probably died all the happier from the belief that he had been mapping the head waters and adding an enormous area to the basin of the Nile.

Livingstone is to be judged by his achievements as an explorer and a pioneer of civilisation rather than by his views as a geographer. The spiteful criticism that, as an explorer, he stands in the highest rank and as a geographer in the very lowest, it is only worth quoting as an illustration of the undoubted superiority of his exploration to his theoretical geography. Livingstone began his work with no training in the general principles of geography, but he showed such skill in surveying and such keen insight that it is difficult to realise how much the world has lost by Livingstone's lack of geographical education. The chief defects of his geographical writings are his neglect of his predecessors and his irritation at unfavourable criticism. Cooley, learned in African lore, was offended by neglect of this subject, and severely denounced what he described as Livingstone's strong dislike of preliminary information. Livingstone's books should, however, be judged as records of his own personal observations and opinions. After he left Britain for South Africa he spent less than two and a half years at home, and during his two visits he was so overpressed with engagements that he had no time to study the literature of African exploration.

It is more important in an appreciation of Livingstone to recognise his relations to his successors than to his predecessors: he was one of those independent pioneers who owe little to either forerunners or contemporaries: but the impression he made on his successors has profoundly influenced the politics of both Africa and Europe.

The year of Livingstone's death, 1873, marked a great turning-point in African history. It closed the work of the dreamers. Men of that type still went to Africa: they go there still: but henceforward they were unimportant compared with those who went to help the administration and the commercial development of the country. Lord Houghton referred, in some verses on Livingstone's funeral, to the promise of a new era in Africa:

> "Morning o'er that weird continent
> Is slowly breaking;
> Europe her sullen self-restraint
> Forsaking."

The dawn which Lord Houghton discerned broke on Africa with dazzling swiftness. Many influences helped its advance. Livingstone's death aroused Europe to a sense of its responsibilities to Africa and the conviction that we are our black brothers' keepers. Gordon had just reached Khartoum to continue Baker's attempt to rescue the Soudan

from the raid of the slave-trader and the misrule of the Pashas. France was beginning to develop her west coast colonies so as to gain in Africa the supremacy she had lost in Europe. The greatest influence of all, however, was that which Livingstone exerted through his pupil Stanley, in whom were growing the interests which Livingstone had planted. Before the end of the year of Livingtone's funeral Stanley was back on the east coast, his life dedicated to the service in which his teacher had fallen.

Stanley's first journey across Africa solved the problems for which Livingstone died; and it led to the foundation of the Congo Free State. That State was founded with high ideals. "I am charged," wrote Stanley, "to open and keep open, if possible, all such districts and countries as I may explore, for the benefit of the commercial world. The mission is supported by a philanthropic society, which numbers noble-minded men of several nations. It is not a religious society, but my instructions are entirely of that spirit. No violence must be used, and wherever rejected, the mission must withdraw to seek another field." And the success of the undertaking which was begun with these motives led to the rapid growth of a keener European interest in Africa, and the subdivision of the continent among the States of Europe. The history of that change has been marred by many crimes and blunders, but there can be no doubt that the Africans are immeasurably safer and happier to-day than they were forty years ago.

Livingstone appears to have died under the impression that his life had been a failure. With the malicious irony of fate the only immediate commercial result of his journey from the Upper Zambesi to the west coast was the opening of the worst slave road and, by the help of his friend, Sekeletu, the most active slave market in Equatorial Africa. The three missions—Episcopalian, Congregational, and Presbyterian—sent to the Zambesi valley in answer to his appeal had all withdrawn: and the work during the later years of his last journey had thrown doubt on the confident conclusions he had announced from its first discoveries. But, forty years onward, we can better realize how great was the work that he accomplished: for the beneficent revolution that has taken place in Africa was due both to Livingtone's discovery of its vast possibilities and to Livingstone's influence on the men who established civilisation where he entered as the heroic pioneer.

THE LIVINGSTONE CENTENARY LOAN EXHIBITION AT THE ROYAL SCOTTISH MUSEUM.

By Alexander Galt, D.Sc., F.R.S.E., Keeper of the Technological Department, the Royal Scottish Museum.

(With Illustrations.)

About eighteen months ago it occurred to the writer that, as the hundredth anniversary of the birth of David Livingstone would fall this

year, the occasion might be appropriately marked by the holding of a Livingstone Loan Exhibition in the Royal Scottish Museum. Official sanction was readily given to the proposal, and there has now been gathered together a highly interesting and complete collection of exhibits, largely of a personal nature, illustrating the life and work of Livingstone. For these the Museum is indebted to many lenders, particularly to the various members of the Livingstone family, all of whom were so kind as to put their treasured possessions at our disposal for a time. Special thanks are due to Mrs. Livingstone Wilson, the youngest and sole surviving member of Dr. Livingstone's own family, and to Captain Livingstone Bruce, a grandson of Dr. Livingstone.

The exhibition was opened on the evening of Monday, March 17, when the Lord Provost, Magistrates, and Council of the city gave a reception in the Museum. The exhibits have evidently aroused great public interest, many thousands of visitors having already come to see them. It is proposed to keep the exhibition open for six months.

The life of David Livingstone has recently been so fully described in the press and on the platform that only those particular aspects of it which are illustrated by the exhibits need be referred to here. Livingstone was born in the village of Blantyre, near Glasgow, on March 19, 1813, and when ten years of age he left school and began work in a cotton mill there. In those days the working hours were long—from six o'clock in the morning till eight at night: and yet, by attending a night school and by self-education, Livingstone contrived to gather a great store of sound learning during the second ten years of his life. The only relic of this period in the exhibition is an Arithmetic Book with Livingstone's signature scribbled all over the inside covers: the date (1826) shows that he was then thirteen years of age. It is recorded that at the age of sixteen he was well versed in Latin, and had read a great part of the writings of Virgil and Horace. His knowledge of the works of standard English and American authors was extensive, and he had made a special study of the subjects of botany, zoology, and geology.

When he had reached his twenty-first year Livingstone decided to prepare himself to become a medical missionary abroad, and accordingly two years later, at the beginning of November 1836, he went to Glasgow for his first session at College. He attended the classes of Chemistry and Anatomy, including lectures and practical work in both subjects, at the Andersonian University, now Anderson's College Medical School. Livingstone's Class Certificates, signed by the professors, are shown in a case labelled "Dr. Livingstone as a Medical Man." He was privileged to study under Dr. Graham, the distinguished Professor of Chemistry, and Dr. Graham's assistant, Mr. James Young, who afterwards gained fame and fortune as the originator of the shale-oil industry in Scotland. In Mr. Young's private laboratory Livingstone received a good training in the use of tools, a training which must have been of great service to him in after years in Africa, and here he met William Thomson (afterwards Lord Kelvin), who as a boy often visited the laboratory. This early friendship between Livingstone and James Young became a most

intimate one, and it continued throughout the whole of Livingstone's subsequent career. In fact, Young's liberality in supporting Livingstone's work of missionary exploration in Africa was very great, culminating in 1872 in the fitting out of a relief expedition at his own expense. A Portrait of James Young is hung on the wall in the gallery. During the succeeding winter, 1837-8, Livingstone again attended classes at the Andersonian University, the subjects being Chemistry and Surgery (lectures and practical classes in both), and Materia Medica, the Class Certificates for which are also shown. Finally, in 1838-9, Livingstone again attended the Anatomy class. During these years he continued to work in the mill in the summer six months.

Meantime Livingstone had offered himself to the London Missionary Society, and he was invited in 1838 to go up to London to undergo, at Ongar in Essex, a few months' training for foreign mission work. Two of Livingstone's Letters belong to this period, and these, along with many others, are exhibited in chronological order. The small handwriting of the early letters is noteworthy, when comparison is made with the large bold style of handwriting adopted in later years.

In 1839 Livingstone began his final medical studies at Charing Cross Hospital, London, under the guidance of Dr. (afterwards Sir) J. Risdon Bennett, whose lectures on the Practice of Medicine he attended. For nearly eighteen months Livingstone gained much valuable training and experience in the practice of medicine and surgery in the wards of the hospital and in Aldersgate Street dispensary. A Certificate of attendance at the dispensary, signed by Dr. Bennett and other physicians and surgeons, may be noted. It was at this period that Livingstone met in London the famous missionary, the Rev. Robert Moffat of Kuruman (who afterwards became his father-in-law), through whose advice it was now arranged that Livingstone should go to the South African mission field. A fine Portrait of Dr. Moffat, at a considerably later period of his life, is included in the collections. Finally, Livingstone went back to Glasgow in November 1840 to submit himself for examination by the Faculty of Physicians and Surgeons. His Medical Diploma from the Faculty is exhibited along with a copy of the Oath, in his own handwriting, required from all new Licentiates. In 1857 the Faculty recognised his eminence by making him an Honorary Fellow. A fine Portrait in oil of Dr. Livingstone has been lent to the exhibition by the Faculty. We may also note here that the Dental and Surgical Instruments used by Dr. Livingstone in Africa are placed beside the diploma and the other medical exhibits.

In an adjacent case may be seen numerous Geological Specimens, collected by Dr. Livingstone during his first great journey, which he presented to the Museum in 1858 through Dr. George Wilson, the first Director, who had been a fellow-student with Livingstone in London. Above these may be noted a splendid Microscope with accessories, in two fine brass-bound boxes, presented by Miss Angela (afterwards the Baroness) Burdett Coutts. The inscription on the boxes is as follows: "To David Livingstone, LL.D., D.C.L., etc. A token of remembrance from Angela G. Burdett Coutts. With her earnest wish that his path

in difficulties may be clear like as this Microscope clears that which the natural eye cannot see. London, January 25, 1858."

Dr. Livingstone sailed for Cape Town in December 1840, and during his long voyage out by sailing-ship, *viâ* Rio de Janeiro, he seems to have been on very friendly terms with the captain, who gave him a sound course of practical instruction in the use of the sextant and in the methods of determining the ship's position at sea. After a short stay at Cape Town, Dr. Livingstone proceeded to Port Elizabeth, from which place he started in May 1841 for Kuruman in Bechuanaland, the most distant missionary station: and during the two months' journey of 700 miles up country by ox-wagon he had his first opportunity of observing the life and customs of the natives. The next two years were spent in making long journeys of exploration into the unknown regions to the north of Kuruman, with the view of making the acquaintance of the different Bechuana tribes, and noting the suitability of the country for missionary stations. He lived alone with one of the tribes for some months to give himself an opportunity of mastering the language, and some years later he wrote a book on the *Analysis of the Bechuana Language*, the autograph manuscript of which is exhibited in a case marked "Dr. Livingstone's Literary and Scientific Work."

In August 1843 he founded a new mission station at Mabotsé, in the territory of the Bakhatla tribe, 250 miles beyond Kuruman. The district was found to be infested with lions, from one of which he had a very narrow escape from death. The lion's teeth had crunched through his upper left arm bone, and as Livingstone was unable to set it properly by himself, that arm was always weak for the rest of his life. It may be stated here that, when Dr. Livingstone's body was brought home from Africa in 1874, the false-jointed arm bone formed one of the principal means of identification of his remains. A Model of this Bone is exhibited in the collections.

A highly important event in Dr. Livingstone's career was his marriage to a daughter of Dr. Moffat, towards the close of the year 1844. Their first home was at Mabotsé, from which they shortly removed to Chonuane in the country of the Bakwain tribe, whose young chief, Setchelé, afterwards became a Christian and a great friend of Dr. Livingstone. A Photograph of Setchelé, taken many years later, is on view. On account of the lack of water, the whole tribe removed with the Livingstones in 1847 to the banks of the river Kolobeng, 40 miles distant, where, for the third time in three years, Dr. Livingstone had to build a home, and here they remained for five years, the last and almost the only home they ever had. Photographs of Mrs. Livingstone and of a family group (including Dr. and Mrs. Livingstone, their elder daughter Agnes, and their three sons), both belonging to a later period, are exhibited. There are also two excellent Busts of Dr. Livingstone in the exhibition.

Dr. Livingstone was not content to continue to live a placid existence as an ordinary medical missionary at Kolobeng, while the vast regions beyond remained in spiritual darkness. Progress westward was barred by the Kalahari desert and to the east by the Boers, who

were determinedly opposed to missionary enterprise. It was therefore decided, in 1849, to make a journey of exploration further north. He was accompanied by Mr. Oswell, a British army officer who was on a hunting expedition, and after travelling about 600 miles Lake Ngami was reached, the first of Dr. Livingstone's many geographical discoveries. A Map of the route followed, constructed by the explorers, is exhibited. The journey to the lake was repeated in 1850, Dr. Livingstone's companions this time being his wife and family. A large Oil Painting, showing the whole family at the lake, has been lent to the exhibition. In 1851 Mr. Oswell and the Livingstones made a third and more extended journey to the north, where they met Sebituane, the chief of the Makololo tribe.

It was now clear to Dr. Livingstone that if the country still further north, of which he had heard great accounts from Sebituane and his people, were to be opened up for missionary enterprise and trade, a new and much shorter and easier route to the sea must be found, as land transport from the Cape was prohibitive on account of the distance (2000 miles). He therefore decided, early in 1852, to return to Cape Town, taking his wife and family with him that they might sail for home, while he remained at the Cape for a few months making preparations for the first, and what turned out to be the greatest, of three remarkable journeys. He had already obtained considerable experience in the use of the sextant and in surveying and mapping out new country, but he wisely placed himself in the hands of Sir Thomas Maclear, Astronomer-Royal, who was so kind as to give him a thorough course of instruction in the more advanced methods of making astronomical and other observations and calculations. Two Sextants used by Dr. Livingstone during his travels in Africa are exhibited in a case headed "Dr. Livingstone's Scientific Instruments." One of them has an inscription in Dr. Livingstone's handwriting: "Sextant much valued as an old companion, D. L." We may also note in the same case his Compass, Chronometer Watch, Artificial Horizon, Aneroid Barometer, Hypsometer, Thermometer, Hygrometer, Tape Measure, Foot-Rule, Drawing Instruments, Parallel Rulers, and Field-Glasses.

Dr. Livingstone left Cape Town on his first great journey in June 1852. He had with him, for the first time, a magic lantern, presented by Mr. Oswell's companion, Mr. Murray, and he used it to illustrate his Bible lessons to the natives. Dr. Livingstone's Lantern may be seen in one of the wall cases along with two Bibles, one of which is inscribed "The Bible which went with me in all my wanderings in Africa. David Livingstone, Feb. 1858." The other was presented by the Rev. Mr. Stewart in 1865, and it was used during the last great journey. Mr. Stewart had been sent out to Africa in 1861, by the then Free Church of Scotland, to meet with Dr. Livingstone and obtain information as to the possibility of founding a mission. Dr. Stewart afterwards became the distinguished head of the Lovedale Mission.

When Dr. Livingstone arrived at Kuruman, three months after leaving Cape Town, he heard that his home at Kolobeng had been destroyed by the Boers and that all his journals were lost. Linyanti,

the capital of the Makololo, was reached in June 1853, and some months later, accompanied by a band of Makololo guides, he started for St. Paul de Loanda on the west coast, where he arrived at the end of May 1854. Great difficulties and dangers were experienced on the way. Dr. Livingstone had also suffered much from fever and dysentery, but by the kind attention of friends at Loanda he gradually recovered, and after a stay

Some of the Instruments used by Dr. Livingstone in Africa.

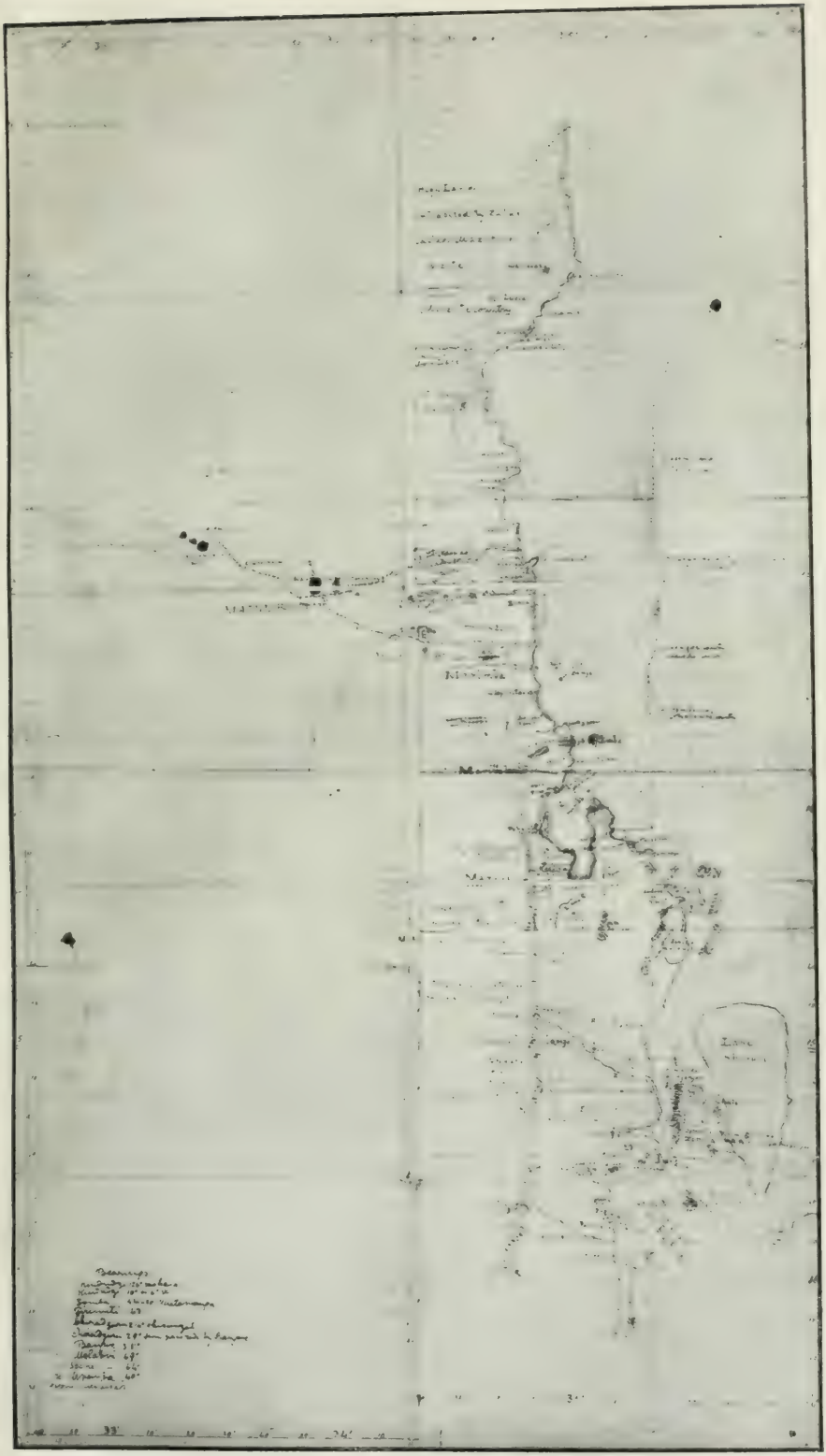
of a few months he began his wonderful journey right across the African continent, a deviation southwards being made to Linyanti, where he engaged a new and much larger body of Makololo guides for the last portion of the journey. The east coast was reached at Quilimane in May 1856, almost four years after leaving Cape Town. Near Linyanti he had discovered the great and now well-known waterfalls on the Zambesi, which he named after Queen Victoria. A large part of the route from Linyanti to Quilimane was down the Zambesi, and a Boat's

Compass used by Dr. Livingstone on the voyage is exhibited. A Photograph of the last survivor of Dr. Livingstone's Makololo guides, taken many years afterwards, is on view.

Speaking at a public meeting at Cape Town in 1856, the Astronomer-Royal, to whom Dr. Livingstone had forwarded copies of his observations so that accurate maps of the hitherto unknown regions explored by him might be constructed, said that, "as far as he knew, Livingstone was the first traveller who had made accurate observations, and that, though Timbuctoo was so well known, it could not be reached by the aid of any recorded observations, as its position was only known in a vague manner. On the other hand, you could go to any point across the entire continent along Livingstone's track and feel certain of your position. I say, what that man has done is unprecedented." Certainly the labour involved in making the many thousands of astronomical, meteorological, and surveying observations, measurements, and calculations during all his travels must have been enormous, and our admiration for the man is not lessened when we remember that, during two of his three great journeys, Dr. Livingstone travelled alone with his native carriers and had thus to take his own observations, that these must often have been made in periods of great weakness through illness or of extreme personal danger, and that his equipment was of the slenderest description. His scientific observations were generally recorded by Dr. Livingstone in special books, one of which has been placed on view in the case labelled "Dr. Livingstone's Literary and Scientific Work." Dr. Livingstone's Pocket Dictionary, signed and dated, is also shown.

The Museum is fortunate in being able to show fifteen original manuscript maps drawn by Dr. Livingstone to illustrate the vast tracts of country explored by him during all his exploratory journeys in Africa. That chosen for reproduction here was kindly lent by Mr. William Stanford.

After Dr. Livingstone's return home, in December 1856, honours were showered upon him. The Royal Geographical Society of London had already, in 1849, awarded him Twenty-five Guineas for his discovery of Lake Ngami; in the following year he had been given a Silver Watch, and in 1855 the Gold Medal of the Society, and now, in 1857, he was made a Foreign Corresponding Member. The Paris Geographical Society also had awarded him, in 1849, its large Silver Medal, and five years later he received a similar Medal in Gold. In 1857 the Society for the Encouragement of Arts and Industries gave him its bronze "Prize Medal of Honour." Dr. Livingstone also received in 1857 the Freedom of London, Edinburgh, Glasgow, Dundee, and Hamilton; the citizens of Glasgow presented him with £2000, and in 1858 the people of South Africa gave him a Silver Casket and 800 guineas, while in 1872 the King of Italy awarded him a Gold Medal. Glasgow University conferred upon him the honorary degree of Doctor of Laws in 1854, and Oxford University made him a D.C.L. in 1857. Nearly all the Caskets, Documents, and Medals, and the Silver Watch, etc., just referred to, are exhibited in a case labelled "Dr. Livingstone's Honours." The Livingstone Gold Medal has also been placed beside the Honours. This medal



Lake Shirwa and part of Lake Nyasa, drawn about 1859 by David Livingstone.

was founded by the late Mrs. A. L. Bruce (Dr. Livingstone's elder daughter), and it is awarded annually by the Royal Scottish Geographical Society for eminence in geographical research.

Much of Dr. Livingstone's time in 1857 was spent in writing his first book, *Missionary Travels*, the Manuscript of which is exhibited. Mention may be made here of the Manuscript of his second book, *The Zambesi and its Tributaries*, descriptive of his second great journey, which is also shown, as well as Dr. Livingstone's Last Journal, sent home with Stanley in 1872. These, with the contents of Dr. Livingstone's many pocket and other Note Books, which may also be seen, formed the basis of the Rev. Mr. Waller's book, *The Last Journals of David Livingstone*. Numerous copies of the first of these three books are shown, one being Dr. Livingstone's own copy, with signature and date, and others with most interesting autograph inscriptions by Dr. Livingstone. Stanley presented a copy of his book, *How I Found Livingstone*, to Dr. Livingstone's elder daughter, and a pleasing autograph inscription by him, with signature and date, may be noted on the fly-leaf.

Dr. Livingstone had interviews with Queen Victoria and the Prince Consort and their children, and before he sailed again for Cape Town in March 1858, accompanied by Mrs. Livingstone and a staff of expert officers, who were to accompany him on his second great journey, he had been made a British Consul in Africa. His Consular Commission, signed by the Queen and by Earl Clarendon, Foreign Secretary, his Consular Cap (so frequently illustrated in books on Dr. Livingstone), and his full-dress Consular Uniform, form interesting exhibits in the collections. In the same wall case may be noted a large pocket knife inscribed "Dr. Livingstone. From his friend Lady Franklin." Dr. Livingstone and his staff proceeded from Cape Town up the east coast to the Zambesi, while Mrs. Livingstone went inland to pay a visit to her parents at Kuruman, where her youngest child was born towards the end of the year. Dr. (afterwards Sir) John Kirk, who is still with us at the ripe age of eighty, was one of the principal members of Dr. Livingstone's party, and he was British Consular Agent at Zanzibar during Dr. Livingstone's last journey. A comparatively recent Portrait of Sir John Kirk is on exhibition.

The second great journey was an unfortunate one in many respects. Difficulties occurred with some members of the staff; another died. Dr. Livingstone himself was repeatedly an eye-witness of some of the worst horrors of the slave-trade, and his indignation against the Portuguese was such that, in his despatches to our Foreign Office at home, he denounced them in the most vigorous language, leading to somewhat strained relations between the British and Portuguese governments. Many of these and other despatches, which have never been published, had been copied by Dr. Livingstone into his Journals, one of which may be seen open at the last page of one despatch and the first page of the next. Dr. Livingstone had promised the Makololo, who had accompanied him in the last part of his first great journey, from Linyanti towards the east coast, that he would return from England and convoy them home. This promise he now fulfilled, but he was dismayed to

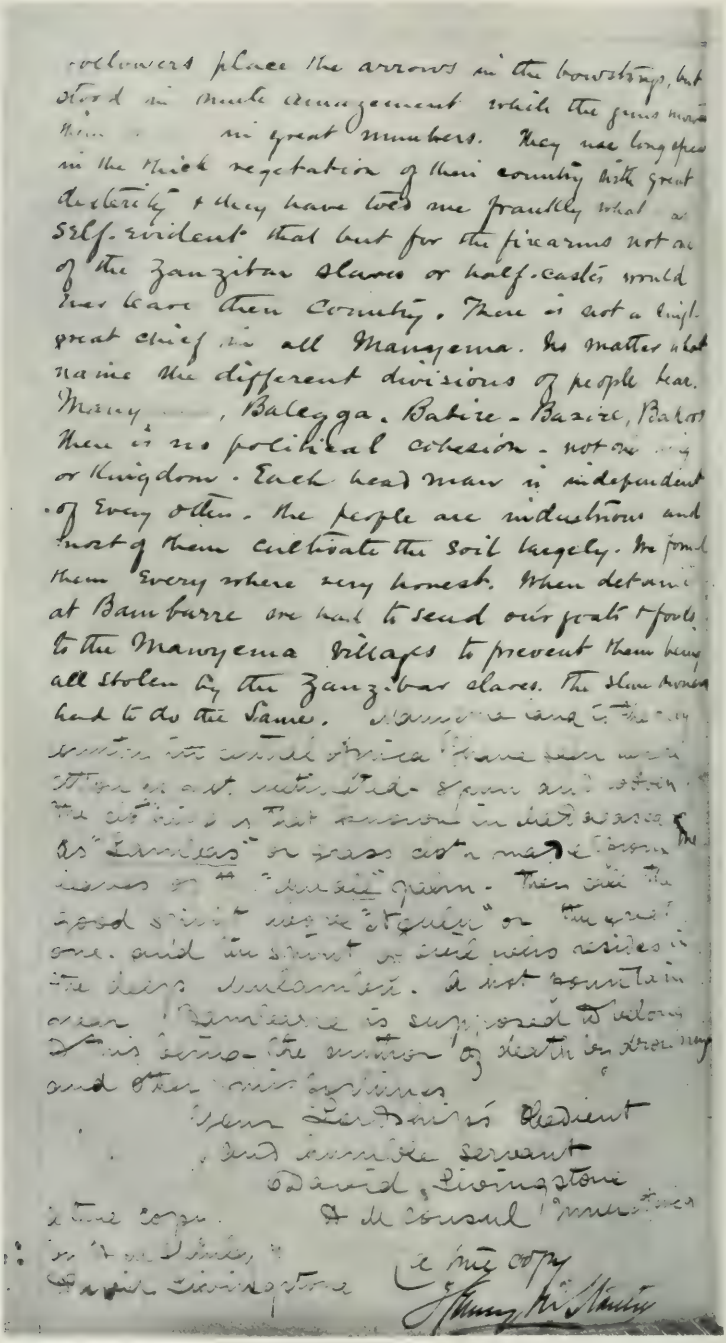
learn on nearing Linyanti that a mission station, established there by the London Missionary Society, had been abandoned owing to the death of the two leaders. A Universities' Mission from England, formed under Dr. Livingstone's guidance, next came to an untimely end, and in April 1862 Mrs. Livingstone, who had not long rejoined her husband, died at Shupanga, owing to protracted delays in the unhealthy lower regions of the Zambesi. A Water Colour Landscape Drawing, showing Mrs. Livingstone's grave near the banks of the Zambesi, and photographs of Bishop Mackenzie and the Rev. Mr. Waller of the Universities' Mission, may be observed on the wall of the exhibition gallery.

Still, the geographical and economic results of this expedition were, or have since become, of the highest importance. The Zambesi and some of its tributaries, especially the Shiré, were thoroughly explored, and Lakes Shirwa and Nyasa were discovered and surveyed. (See map facing p. 248.)

The expedition was recalled by the Government in 1863, and in the following year Dr. Livingstone sailed his little steamboat, the *Lady Nyasa*, across the Indian Ocean from Zanzibar to Bombay, to prevent its falling into the hands of the slave-dealers on the African coast. This voyage was one of the most remarkable incidents in the whole of his career.

Dr. Livingstone reached London in July 1864, and after little more than a year at home, spent mainly at Newstead Abbey, by the kind invitation of Mr. and Mrs. Webb, in writing his Second Book, *The Zambesi and its Tributaries*, he left in September 1865 for Bombay, where he disposed of the *Lady Nyasa*. Proceeding to Zanzibar early in 1866, he began his third and last great journey from the mouth of the Rovuma, 250 miles to the south of Zanzibar. Rumours of Dr. Livingstone's death reached the coast a year later, and the Royal Geographical Society sent out a search expedition under Mr. E. D. Young, a member of his staff on the previous expedition, who, though he did not find Livingstone, ascertained that the rumours were untrue. Bad as Dr. Livingstone's experiences were in his former journeys, they were as nothing compared with what happened now. Almost wherever he went he was a witness of the slave-trade and its dreadful evils. For long periods his own circumstances were so critical that but for the help of an Arab slave-dealer he must have died. He was even compelled to travel in the company of slave gangs, and while making one of his long journeys in this manner to Ujiji for letters and supplies he experienced another of his many narrow escapes from death, a hostile native having thrown at him a spear which just grazed his head. This Spear is shown in a wall case, along with small pocket Pistols and Powder Flasks and a double-barrelled breech-loading Rifle, used by Dr. Livingstone to obtain game for food. He had also run out of writing-paper and ink, and he had to continue the record of his voluminous daily notes and scientific observations on journal books made from Newspapers and the edgings of Pamphlets, etc., with "ink" of his own manufacture. Examples of these singular journals are on view.

The Arab traders between the great lakes and the east coast had



Part of a Despatch sent by Dr. Livingstone to the Foreign Office, describing his journeys in the Manyema country in search of the sources of the Nile.

deliberately foiled for years all his attempts to gain new supplies from, or to get into communication with, Zanzibar and home; and the loss of his medicine chest early in his travels, owing to the carelessness of a native carrier, resulted in almost constant and very severe illness, so that when Mr. H. M. Stanley, who had gone to Africa on behalf of the *New York Herald* to try and find Livingstone, actually did find him at Ujiji, on Lake Tanganyika, in October 1871, he was in sore straits indeed. A very interesting exhibit is Stanley's own Map constructed by himself in mapping the country traversed by him between Zanzibar and Ujiji, a distance of 800 miles.

Notwithstanding his terrible experiences, Dr. Livingstone had again been able to explore immense tracts of new country during the intervening five and a half years. He had travelled in a south-westerly direction from the Rovuma till the south end of Lake Nyasa was rounded, and then marching to the north-west he finally reached Lake Tanganyika, which he surveyed and mapped. The Map of Lake Tanganyika is one of the most interesting of Dr. Livingstone's manuscript maps. Lakes Mweru and Bangweolo were discovered and their boundaries determined, and the upper waters of the river Lualaba, which he at first thought might be the beginnings of the Nile but which really belonged to the basin of the Congo, were traced. It is interesting to note that Dr. Livingstone had with him a copy, evidently drawn by himself, of an old map of the northern half of Africa, in which the Nile is shown as rising in the "Mountains of the Moon." This Map is also on view.

After staying with Dr. Livingstone for a few months, Stanley left for Zanzibar. Dr. Livingstone waited at Unyanyembe, 500 miles distant from Zanzibar, for further stores and an excellent band of native helpers which Stanley obtained for him at Zanzibar, and then in August 1872 he marched towards the heart of Africa for the last time. But he was now unable to stand the strain, and on May 1, 1873, he died at Chitambo's village near the southern shore of Lake Bangweolo. His heart was buried under a tree near by, and the body was embalmed and carried, with his effects, by his faithful native followers, Chuma, Susi, Wainwright and others to Zanzibar, a distance of 1500 miles. Nine months were required for the performance of this self-imposed task of love and loyalty. From Zanzibar Dr. Livingstone's remains were conveyed to England and were buried in Westminster Abbey. A Model of the Hut in which Dr. Livingstone died, constructed by the native attendants after their arrival in England, is on view. Photographs of Wainwright, Chuma, and Susi may be noted, as well as a Picture showing all three taking an inventory of Dr. Livingstone's effects after his death. A fine water-colour Drawing of the interior of Westminster Abbey, indicating the position of Dr. Livingstone's grave, has been placed on the wall in the exhibition near the British Flag which Dr. Livingstone had carried during his travels in Africa.

Any appreciation of Livingstone's life and work would be incomplete if his eminence as a naturalist were not referred to. As a medical missionary and as an explorer his fame is known to all. But students

of natural science who may read Dr. Livingstone's published writings cannot fail to be impressed by the scientific method shown when he pauses in his narrative at times to describe and discuss observations in such subjects as Botany, Zoology, Geology, Meteorology, etc. It is understood that a great mass of unpublished material in various branches of science exists in Dr. Livingstone's manuscript journals. Probably he had hoped to prepare it for publication at home when his work of African exploration was completed. Should not this duty be now undertaken by others?

As illustrative of Dr. Livingstone's abilities in Natural Science, we may take, for example, his observations on the tsetse fly, recorded on pages 80-83, 337, and 352 of his first book, *Missionary Travels*. This fly appears to have been indigenous to Africa for many centuries: the descriptions given in the Bible at Exodus (chapters 8 and 9) and Isaiah (chapter 7), clearly show that the tsetse fly is referred to. Yet Dr. Livingstone was evidently the first in modern times to give (in 1843) accurate authentic information regarding this African scourge, though Major Vardon, who, like Mr. Oswell, had gone to Africa on a hunting expedition and had met Dr. Livingstone, was the first to bring home (in 1848) specimens of the fly. During his early travels, Dr. Livingstone had also sent home specimens, for the identification of which the writer is indebted to the Natural History department of the Museum, and they are now lent to the exhibition.

It may be added that, with the view of illustrating native life and environment in the different regions which Dr. Livingstone traversed, many ethnographical and other specimens, drawn mainly from the permanent collections of the Museum, have been temporarily placed on view in the exhibition gallery.

DAVID LIVINGSTONE AND HIS WORK IN AFRICA.[1]

By Sir Harry Johnston, G.C.M.G., K.C.B.,
Livingstone Gold Medallist, Royal Scottish Geographical Society.

Before I venture to speak to you on the subject of Livingstone's journeys in South and Central Africa, his researches and discoveries, and the results which sprang from them, I should like to address you, as I have already done other members of this Geographical Society in Glasgow, *more especially as a Scottish audience*, as fellow-countrymen of Livingstone, and consequently, presumably, even more keenly interested in the celebration of his life's work, more jealous that he shall receive his due recognition, more anxious that the full effect of his researches

[1] This article contains Sir Harry Johnston's Introductory Remarks before the delivery of his Livingstone Centenary Address in Edinburgh on March 27 last. The Address will appear in the next issue of the *Magazine*.

should be given to the world than those of us who live south of the Border. Not only was Livingstone one of the greatest amongst the amazing explorers of Scotland sent out to make known the unknown,—and on your wonderful roll of honour you have already had to inscribe William Lithgow, who explored North Africa in the seventeenth century; the heroes of Darien; James Bruce; Sir Alexander Mackenzie; Mungo Park; and Robert Moffat—but the work of Livingstone was materially assisted, furthered, and brought to fruition by other Scots, by Sir John Kirk, Edward Rae (a Highlander whose name was originally spelt Reach), Joseph Thomson, John and Frederick Moir (sons of an Edinburgh doctor), Dr. Stewart of Lovedale, Dr. Robert Laws of Nyasaland, Henry Henderson, John Buchanan, David Ruffele-Scott, Duncan Fraser, and Alexander Hetherick—to mention only a few of those who have left their mark on South and Central Africa: while south of the Zambesi, a Scotsman, John Mackenzie, was the real creator, in succession to Livingstone, of British Bechuanaland, was the man who really secured the British road north from the Orange River and the Limpopo to the Zambesi.

For a nation which still numbers under five millions of people,—and was about half as numerous at the time when these great deeds were done, deeds which have changed the history of the world—this is an amazing record, exceeding that of Portugal, Norway, or Switzerland, the only European countries which being mountainous and of restricted agricultural area, have turned the energies of their adventurous people to regions far beyond their own frontiers.

But the question I wish to put to you to-night is "how much" are you proud of Livingstone and those who came before and followed after? Not much, I fear, so far as the expenditure of money and unproductive and disinterested effort are concerned. If, for example, Glasgow's pride in Livingstone, who was born in what is now virtually a suburb of Glasgow, were on a par with the wealth and enterprise of that mighty city—practically the second in the British dominions in point of population—the house in which Livingstone first saw the light, and in which he spent his boyhood, would not be as it is at this moment, a place of singular squalor. I visited and photographed this block of houses and its surroundings in 1890, and I have my photographs to prove that since that date not only has the neighbourhood "gone down," but it has been allowed by the civic authorities of Blantyre and of Glasgow to become actually disgusting. Yet this little group of two or three stone houses is far from being unpicturesque, nor are they at all discreditable examples of late eighteenth-century domestic architecture in Scotland. If Glasgow did its duty by the memory of Livingstone it would raise a public subscription, and its municipality would vote a sum out of the rates; something further might be squeezed from Blantyre and the neighbourhood: and the money thus produced would go to purchase this group of houses and the strip of land between them and the banks of the Clyde. Some of the rubbishy tenements which now crowd up to them could be demolished, and a sufficient space of land round them might be judiciously planted with trees to regain the picturesque sur-

roundings of Livingstone's boyhood. The houses—at any rate the house wherein Livingstone lived— might be furnished as far as possible according to the period; and the whole should constitute a very interesting little museum of itself, illustrating domestic life amongst the educated poor in Scotland at the beginning of the nineteenth century. Many domestic relics of Livingstone might there be housed.

Then Americans, Englishmen, Germans, Scandinavians, Frenchmen, Portuguese, who are now beginning to make Blantyre a place of pilgrimage when on a visit to Scotland, would not recoil from it with something like loathing and rightly appraise the very scanty interest which Glasgow really takes in the name and fame of Livingstone.

Now: what can Edinburgh do? Edinburgh can put forth its whole strength as the royal city of Scotland to secure for permanent exhibition in its National Museum the collection we have all examined with so much interest and profit, which is at present being shown there—an exhibition which reflects great credit on Dr. Galt and Mr. D. J. Vallance, who have organised it, and on the descendants and friends of Livingstone who have contributed to it. I feel that a most strenuous appeal must be made to Scotland, in particular, that this collection thus brought together should never again be dissipated into space. A Livingstone Museum illustrative of a most interesting phase in the history of Africa should be a permanent section of the National Museum of Scotland. Of course, with the cheap way in which we have all become accustomed to deal with great explorers and men of science, this will seem to be an object easy of attainment: the various lenders of exhibits would be asked to present them to the nation, and if they declined, most unkind things would be said about them. Now this is not my idea at all. Livingstone was most scurvily treated by the Government of Great Britain. He served that Government for fifteen years as a consul in East-Central Africa. For six out of those fifteen years he received salary at the rate of £500 a year, but a good proportion of that had to go in meeting necessary expenses of the expedition, which the Foreign Office would not defray. In fact as against the £3000 in all which Livingstone received from the Foreign Office between 1858 and 1864 he actually expended on the work of this Government expedition in Zambezia nearly £7000 of his own money. This £7000 and all, in fact, that he was able to make and set aside for pursuing his disinterested objects, rearing and educating his children, was derived entirely from his work as an author and from his generous publisher, John Murray. But for Livingstone's three books he would have died a very poor man, leaving little or nothing to his children. As it was he left them comparatively little. It will seem almost incredible to future generations that after his death not one single penny was found by public subscription or obtained by direct grant from the British Government for the assistance of Livingstone's surviving sons and daughters. One of the sons struggled for years to maintain himself, his wife and family, though stricken with phthisis; one of the daughters, early left a widow, had similar difficulties in maintaining herself and educating her children; and had it not been for the fact that another daughter had the good

fortune to marry one who was not only a man of means but a man of great generosity, the circumstances of Livingstone's descendants would have not been far removed from penury. Therefore I hold that some slight reparation should be made even late in the day, and if Scotland desires to be worthy of having engendered Livingstone, she should at once provide out of her revenues an endowment fund for this Livingstone section of the National Museum, and out of this purchase from all the lenders the exhibits which I regard as being of exceptional interest, not merely as illustrating in a very vivid fashion the adventures, resources, and talents of Livingstone, but as a unique contribution to the history of Africa. Such a Livingstone section will draw an appreciably large number of pilgrims annually to Edinburgh. Therefore, I think the great railway companies and the great hotels might at any rate send a small contribution to the Livingstone Exhibition fund.

So much for Scotland. Now what can Great Britain do unitedly to the memory of Livingstone and for the making of full and practical use of all Livingstone's work in Africa? The full force of public opinion must be brought to bear on the Foreign Office to induce that Department to publish as fully as possible all Livingstone's Government despatches between 1858 and 1873. Mere tedious detail and a few criticisms and personal remarks might be left out, but the mass of his despatches will be found to be of very great interest as part of the history of East Africa. If this is too much trouble for a Government Department to take, then it might authorise some person in whom it had confidence to have access to these despatches—many or all of which are in what is known as confidential print, though after this lapse of time there is of course nothing confidential about them. Next, the Government of Cape Colony should be approached with a view to the careful printing of all Livingstone's manuscript vocabularies, said to be stored in the Grey Library.

Then there are still surviving several noteworthy people who have known Livingstone. These should be encouraged to send in their reminiscences. For the most part they are silent folk averse from writing but not averse from criticism. They are very ready to find fault with all extant books and articles on Livingstone, declaring such and such a detail is inaccurate, but they do not themselves publish their reminiscences, though these, so far as I have seen them in private letters, are sometimes of great interest and obvious accuracy.

In short, what we want and what Scotland should make it a national duty to obtain, and if necessary to subsidise, is a new and complete Life of Livingstone, which shall contain all the unpublished scientific material now in the possession of Captain Livingstone Bruce, the manuscript vocabularies (of immense interest to students of the Bantu languages) from the Grey Library, the gist of the despatches to the Foreign Office, and all reminiscences regarding Livingstone's life in Scotland and in England which are not mere twaddle. I would suggest that before I leave these indiscretions and deliver my geographical discourse, that such a work as this might be edited by a *Committee* rather than by a single individual, and this committee should consist of *Captain Livingstone Bruce*

(grandson), *Mrs. Livingstone Wilson* (daughter), *Captain John Kirk* (as representing his father, Sir John Kirk, who has a great mass of interesting correspondence and many original photographs taken by himself in Livingstone's company), *Mrs. Fraser* (the daughter of William Webb), *Miss Alice Werner*, the well-known student of Bantu languages, and one who has traversed herself nearly all the scenes of Livingstone's life in South and Central Africa, and *Mr. Ralph Durand*, whose recently published articles in the *African Mail* show him to be singularly well fitted to deal with the contemporary geographical criticism or acknowledgments of Livingstone's discoveries.

This, I think you will admit, is a concrete and practical proposal, and if adopted—and it could be adopted and carried through if Scotland willed—it would give to the world such a revelation of Livingstone's work as would ensure for him far greater recognition as an African discoverer than he has yet been accorded.

I make no appeal to private generosity. Private generosity has all along had to pay the bill in regard to Livingstone. I wish to urge all Scots, men and women, to demand that this national reparation to Livingstone, this full fructification of his work as Government official and Scottish scientific explorer shall be paid for—the total cost will not be great—out of Scottish national and civic funds, aided also by grants from a few great corporations which are virtually departments of State. None of the money raised is to be spent on philanthropic or missionary purposes (except that all expenditure on education *is* a contribution to Christian philanthropy). The objects to be attained are three: the preservation of the site of Livingstone's birth at Blantyre as a national monument and museum; the permanent instalment of a Livingstone Memorial Exhibition in the National Museum at Edinburgh; and the compilation of a new Life of Livingstone, which shall include the gist of his despatches to the Foreign Office, the unpublished scientific material in the possession of Captain Livingstone Bruce, and the manuscripts hidden in the Grey Library at Cape Town.

THE PLANT ECOLOGY OF BEN ARMINE (SUTHERLANDSHIRE).

By C. B. Crampton, M.B., C.M., and M. Macgregor, B.Sc.

(*With Diagrams.*)

(*Continued from page* 192.)

IV.—The Vegetation of the Corries and Crag Plant Associations.

The vegetation in the corries varies rapidly from point to point, and indeed is kaleidoscopic in its changes. Without studying the influence of the physiography any attempt to describe the ecology would be hopeless.

The walls of the corries are formed of highly inclined faces of rock, rarely vertical or overhanging, broken by ledges, and overlooking slopes formed chiefly of fallen blocks and fans of debris more or less peat-covered, or exposing ice-worn rock surfaces. This we find in the centre of the corries immediately underlying the mountain-top debris, while the marginal areas are generally far less precipitous, with glaciated rocks and scattered crags, separated and overhung by slopes covered with slipping peat.

The steep rock faces of the central parts of the corries were the areas of greatest rock erosion during the corrie glacier phase, and are still the areas most subject to change under the influence of frost and gravity. The lateral crags and slopes, on the other hand, are in many cases only now emerging from a widely enveloping mantle of peat.

We may therefore distinguish, from the outset, certain areas of steep crags and slopes exposed to atmospheric influences only, or to the water from springs percolating the mountain-top debris or the joints of the rocks, from others where the surface run off is apt to be more contaminated by waters from peat undergoing erosion. We have also to consider the physiography as it affects each ledge, rock surface, fallen block, or slope of debris. Most of these may be found under one or another of five conditions which to some extent merge into one another. They are that the surfaces are—

1. Subject only to atmospheric precipitation and leaching.
2. Little subject to atmospheric precipitation or to flushing with drainage waters.
3. Chasmophyte or chomophyte vegetation fed by mineralised waters draining from above.
4. Vegetation fed by waters receiving manure of animals, and especially beneath eyries.
5. Surfaces fed or flushed by waters contaminated with peat.

1. In the first class the rock faces become covered with flat growths of lichens, species of *Lecidea*, *Lecanora*, etc., and patches of *Frullania* and hair-like tresses of *Alectoria*, and dotted over with small close cushions of *Grimmia* and other mosses. The tops of spurs, crests and fallen blocks show peltate discs of *Umbilicaria*, or fruticose or foliaceous growths of *Cladonia*, *Sphærophoron*, *Platysma*, etc., with cushions of *Rhacomitrium*, *Hedwigia*, etc., and in the humus that accumulates, *Empetrum*, *Arctostaphylos*, *Vaccinium Vitis-idæa*, or even seedling Rowans (*Pyrus Aucuparia*) may take up their residence. The ridges and isolated prominences on slopes of debris usually support *Calluna*, and are generally more or less peat covered.

2. Old established overhanging faces, subject neither to leaching nor definite flushing, are sometimes very dry, at other times damp from condensation of moisture. In the latter cases large surfaces may be orange with the alga *Trentepohlia aurea*, and little damp cracks have swelling cushions of *Bartramia ithyphylla*, *Weissia rupestris* or *Blindia acuta*. Drier crevices frequently support cushions of *Grimmia torquata* or *G. funalis*.

3. In the third class we find debris-covered ledges with a chomophyte,

and cracks with chasmophyte vegetation of a more varied and attractive nature.

The wet cracks especially favour *Sedum Rhodiola*, *Saxifraga stellaris*, *Oxyria reniformis*, etc. Small ledges have *Saxifraga oppositifolia*, *Thalictrum alpinum*, *Saussurea alpina*, *Silene acaulis* and masses of various mosses and hepatics. Wider ledges support a more vigorous vegetation, especially *Vaccinium Myrtillus*, with species of *Salix*, sometimes *S. lapponum*, but if sloping and with much rainwash, grass-land with *Alchemilla alpina* usually takes possession. Shaded crevices show *Cystopteris fragilis*, and sometimes *Asplenium viride*, *Polypodium Dryopteris* or *Phegopteris polypioides*.

Flushed rock surfaces are sharply separable from those receiving only atmospheric precipitation and usually support algal or algal-bryophyte associations to the exclusion of lichens. They are referred to in another section. The waters descending the crags spread over the slopes of debris beneath, covering them with rainwash and forming channels of erosion on their surface. Those flushed surfaces are avoided by *Calluna* and most other peat-loving plants, and form patches of alpine grass-land or damp hollows with *Carex* or other types of flushes.

4. The fourth class are related by degrees to the last, but become specially prominent under crags with eagles' eyries or resting-places. The vegetation is very rank. *Luzula sylvatica* often forms dense mats, and certain mosses are very luxuriant, forming wide sheets and hanging masses. *Aira cæspitosa* appears in its tufted lowland form, and Valerian, *Spiræa Ulmaria*, *Geum urbanum*, *Carduus palustris* (Marsh Thistle) and other coarse plants are conspicuous. The Globe Flower (*Trollius*) is often very abundant in these places, but is also seen on most of the ledges with strong vegetation. Nettles (*Urtica*) are not uncommon beneath eagles' eyries in the Highlands, but were not noticed on Ben Armine.

5. In the fifth class we find ledges, rock faces and slopes subject to peaty drainage. The ledges accumulate peat and support a moorland flora, often masses of *Sphagnum* with *Pinguicula*, etc., when very wet, and *Calluna* when the drainage temporarily or permanently deserts the surface. Rock faces with a peaty drainage often support lichens, distinguishing them from most other flushed rocks, except those subject to salt spray. These lichens are chiefly species of *Cladonia*, *Verrucaria*, *Platysma*, *Stereocaulon*, and accompany patches of *Sphagnum*, black masses of *Nardia*, *Marsupella*, *Pleurozia*, *Rhacomitrium* or *Campylopus*. The slopes at these places are invariably peat covered and support *Calluna* moor or moorland flushes, according to the nature of the surface.

The apparent confusion in the vegetation of the corries is therefore in reality a nicely adjusted arrangement of chomophyte, chasmophyte, lithophyte and flush associations, resulting from the past and present conditions of physiography as affecting snow-lie, rock-erosion, exposure to light and wind, and the direction and the nature of the water supply and drainage.

The chomophyte associations are either outliers of moorland vegetation or peculiar to the station according to these influences. The chasmophyte species more closely approach the endemic. The lithophytes vary chiefly with the age, and orientation of the rock face and the nature

of the drainage, and certain of them will need further consideration in the section on flushes.

Each ledge overlies a rock face, and this in turn another ledge or slope of talus. The drainage from each overlying member affects, or fails to affect, the vegetation of that beneath. Thus a ledge is liable to leaching or is fed with waters from the rock face above, and beneath all the larger crags we frequently find a slope covered with alpine grass-land.

As to the relative preponderance of these various associations in the corries of Ben Armine it must be kept in mind that the moorland plants still dominate all places in Central Sutherland where the migratory factors of change are not in full possession. On peat-covered mountains like Ben Armine alpine associations are very limited in their range, and the lithophyte and other associations are chiefly such as can withstand the rigorous conditions imposed by isolation in, and close contact with, moorland peat.

V. The Plant Associations of Springs and Flushes.

These formations, geologically speaking, belong to the drainage system, but the flow of water is so gentle and circumscribed or ephemeral in its action, or so different from that of streams in its physical and chemical properties, that the plant associations, though more closely related to those of the stream belt than any others, have peculiarities of their own which require examination. The springs of this area range from alpine springs with a very low temperature to springs rising in the moorland peat containing much humus and ferruginous substances, but there appear to be many stages connecting these types, and local differences are also perceptible, depending upon other factors which have not as yet been sufficiently studied to afford satisfactory explanations.

The alpine springs rise from beneath the rock debris in the higher parts of the corries, and often in positions that are subject to snow-lie in the early part of the year. They ooze up to the surface along the line where the junction of the mountain-top debris with the solid rock is exposed on the steep slopes. The water is thus derived from the debris, and is cold and but little contaminated with peaty substances. The alpine spring associations comprise characteristically smooth cushions of mosses of beautifully varied green and red tints, with various low plants growing on the surface and round the margins. The following are characteristic species :—

Philonotis fontana, *Dicranella squarrosa*, *Scapania dentata*, *Marsupella emarginata*, *Hypnum sarmentosum*, *Bryum Duvalii*, *Mnium punctatum* var. *elatum*, *Epilobium alpinum*, *Saxifraga stellaris*, *Viola palustris* (dwarf), *Rumex Acetosa* (dwarf), *Montia fontana*, *Selaginella selaginoides*.[1]

The bog springs break out in thick peat where it has cracked from movements, and generally on or near the base of gentle slopes. They

[1] C. H. Ostenfeld.—*The Land Vegetation of the Faroes*, 1908, p. 847. See also *Types of British Vegetation*, p. 326.

form spongy surfaces, flat or tumid, floating on water, and sometimes of sufficient size and depth to drown animals unwary enough to venture on to them. The floating masses consist of species of *Sphagna* (cuspidata) or *Hypnum revolvens*, or smooth fastigiate growths of *Hypnum stramineum*. *Stellaria uliginosa* grows on the surface, and *Juncus bulbosus* (*forma fluitans*) is generally present.

Springs with limy waters are common enough in the Ben Griam and Ben Loyal districts further north, and also in Caithness, where the Old Red Sandstone rocks and drift often contain much lime. In the Ben Armine district some of the hornblende gneisses have lime, but the drift is rarely very calcareous. Where gentle oozing springs break out from crevices and ledges of hornblende gneisses we find tumid cushions or sheets of one or other of the following mosses:—*Hypnum commutatum*, *H. scorpioides*, *H. molluscum*, *Brentelia arcuata*, *Hypnum filicinum*, *H. falcatum*, with *Saxifraga aizoides*, *Thalictrum alpinum*, *Saxifraga oppositifolia*, *Galium boreale*, etc.

Boggy calcareous flushes from springs have some of the above mosses, with *Saxifraga aizoides*, *Schœnus nigricans*, *Carex flava*, *C. flacca*, *C. pulicaris*, *Euphrasia* sp., *Linum catharticum*, *Pedicularis palustris* (Lousewort), *Scirpus pauciflorus*. They are generally margined with *Hypnum molluscum* and *Thalictrum alpinum*.

The most important flushes of this area are, however:—

1. Rock flushes.
2. Flushes forming alpine grass-lands.
3. Moorland flushes.

The two former are practically confined to the steep slopes and corries of the eastern face of Ben Armine, but the last named are widespread.

Rock flushes must be separated from other rock habitats, and also from other types of flushes on soils capable of easy erosion. They may be classified as rock surfaces subject to a gentle trickling stream of water, either constant in its action or sufficiently frequent in its occurrence to cause a special type of vegetation, different from neighbouring uninfluenced rock surfaces.

Vertical or nearly vertical faces with a comparatively constant trickle of water support an algal vegetation only, whilst others only periodically flushed form the station of very defined associations of bryophytes and algæ, varying from open to closed formations, and these again to open formations, with the results of progression and retrogression and reinitiation of plant successions induced by an increasing erosive power of the water as soil accumulates, and a tendency to migrate from point to point, deserting one part of the rock surface for another.[1]

The rock flushes of the Ben Armine corries have associations which have been looked upon as characteristic of positions of snow-lie, and have been described as such in Switzerland and in this country.[2] From the

[1] C. B. Crampton.—"The Geological Relations of Stable and Migratory Plant Formations."—*Scottish Botanical Review*, vol. i., pts. 1, 2, 3, Jan.-July 1912.

[2] W. G. Smith.—"Anthelia: an Arctic Alpine-Plant Association."—*Scottish Botanical Review*, vol. i., No. 2, April 1912, p. 81.

wide distribution of this type of association in the corries there seems, however, to be some doubt as to what extent snow waters are essential for their formation. They are always found on rock surfaces or coarse rock debris on which other types of flush plants can gain no footing. The probabilities seem to be that the snow-lie is the cause of the baring of rocks owing to any other soil than peat becoming slush, and slipping off the face of the rocks. The snow-lie may also act as a deterrent to other species, and the trapped dust and scrapings from the rocks may have some peculiar nutritive influence, as has been suggested. Even lichens are denied any rest at places where snow lies long on sloping rock faces. Parts of the corries that have well-defined snow-lie on a peat surface show an entirely different association, in which *Nardus stricta* is the dominant species.

In the rock flushes in the Ben Armine corries the plant succession is as follows :—

1. Blue-green algæ forming a thin slimy mat, and consisting of *Stigonema* and *Schizonema* closely interwoven.

2. *Anthelia* (*juliacea*?) and *Marsupella emarginata* (forma)[1] forming whitish green and purplish brown to black cushions and mats. The *Marsupella* occupies the parts liable to the greatest flushing.

3. Large black cushions of *Campylopus atrovirens* and patches of *Andræa petrophila* and *Gymnomitrium* (two sp. ?) invade the station.

At this stage the association generally degenerates, either through invasion by various moorland species, including *Pleurozia*, *Pinguicula*, *Nardus*, etc., or through erosion or drying up, the flush migrating elsewhere.

If erosion takes place the succession may begin all over again, but when the flush dries up, most of the accumulated material gradually vanishes, and the rock is left scattered over with little patches of *Andræa* and *Gymnomitrium*. These gradually become confined to damp crevices, and lichens appropriate the general surface, and are joined by drought-resisting species of *Grimmia* and *Rhacomitrium*. Owing to the migratory nature of the formation large surfaces are left dotted over with *Andræa* and *Gymnomitrium*. Every stage between arrest by invasion and that by drying up may be seen. The order of succession is not quite constant, but the climax stage appears to be that of *Anthelia* and *Marsupella*.

Other types of flushes occur in the corries where the water from springs or surface run-off carries rain-wash over the slopes beneath the crags. They are partly on fans of debris and partly on peat, and show gradations between moorland flushes and alpine grass-land. Thus we have

1. Wet flushes with *Nardus*, *Juncus squarrosus*, etc.
2. Wet flushes with *Carex Goodenovii*, *C. echinata*, *Pinguicula*, *Viola palustris*, etc.
3. Wet flushes with *Carex pulicaris*, *C. flava*, *C. flacca*, *C. dioica*, *Pedicularis palustris*, *Linum catharticum*, etc., indicating the neutralising effect of lime in the waters.

[1] This species is perhaps *Pearsonii*. See MacVicar's *Student's Handbook*, p. 116.

4. Grassy patches with *Agrostis*, *Anthoxanthum*, *Carex pilulifera*, *Luzula multiflora*, *Galium saxatile*, *Polygala*, *Potentilla erecta*, *Hylocomium squarrosum*, etc.
5. Larger areas of alpine grass-land on the steeper slopes beneath large crags. *Festuca vivipara*, *Anthoxanthum*, *Aira cæspitosa*, var. *brevifolia*, *Luzula sylvatica*, *Vaccinium Myrtillus*, *Alchemilla alpina*, *Thalictrum alpinum*, etc.[1]

The moorland flushes on the plateau are generally due to the overflow from bog springs. The wetter types have a central belt of *Sphagna* (chiefly cuspidata and subsecunda) margined by *Juncus effusus* with *Carex Goodenovii*, *C. canescens*, *C. echinatus*, etc. Drier channels have a thick carpet of *Polytrichum commune*.

The large *Molinia* flushes, so common in the Baddanloch hollow a few miles further north and in the central hollow of Sutherland to the south-west, are rarely met with on the higher part of the plateau.

VI. The Plant Associations of the Stream Belt.

The Rocky Stream Channel may be considered to include all rock surfaces liable to submergence in the stream, but, comparatively speaking, immovable under conditions of flood.

There is a well-marked zonation of plants in the rocky stream channel of this area. First we have a zonation of bryophytes having relations to the frequency of submergence.

1. Associations beyond the ordinary limits of flooding—*Rhacomitrium heterostichum*, *R. fasciculare*, and lichens generally abundant.
2. Submerged only during floods—*Rhacomitrium aciculare*.
3. Always partly submerged (larger streams)—*Hypnum palustre*, *Brachythecium rivulare*, and in the higher-level streams with less erosive powers *Scapania dentata*, *Marsupella aquatica*.
4. High-level shallow streams, peaty waters—*Scapania undulata*.
5. Always completely submerged except in prolonged drought—*Fontinalis antipyretica*.

There is also a zonation relative to aeration and rapidity of the waters.

1. *Sacheria fluviatilis* (torrents only).
2. *Brachythecium rivulare*, *Hypnum ochraceum* (waterfalls particularly).
3. *Hypnum palustre*, *H. eugyrium* (rapid waters only).
4. *Scapania undulata*.
5. *Fontinalis antipyretica* (quiet waters).

Fontinalis squamosa takes the place of *F. antipyretica* in the granite bound pools of the Allt Coire na Fearna, where the waters are purer, but with much sand and grit.

Where the streams are full of boulders, each stone that is big enough to project from the water shows this zonation, and the up-stream side of

[1] The alpine grass-lands were first noted by Robert Smith in this country; further accounts of them will be found in Crampton, *The Vegetation of Caithness*, *The Geological Relations of Stable and Migratory Plant Formations*, and in *Types of British Vegetation*.

the larger boulders subject to a rapid current supports a different association to that which faces the quiet pool with eddies down-stream.

A few shaded rock gorges occur in the vicinity of Ben Armine, but outside the limits of the area shown on the map. In these places the zonation is different to that of the exposed waterfalls, and the following are noticeable:—*Porotrichum alopecurum*, *Hypocomium flagellare*, and *Eurynchium rusciforme*, the last named forming the lowest zone partly submerged at low water. The stems of nearly all the mosses in submerged habitats become black, hard, and fibrous, and denuded of leaves below.

Banks of Stream Erosion and Alluvial Surfaces.—When the bank within the flood zone consists of partly consolidated sand and gravel, or washed peat, we find the following zonation:—

1. Zone beyond the reach of ordinary floods, moorland species, *Hylocomium splendens* abundant.

2. At limits of ordinary floods, *Polytrichum commune*, *Hylocomium squarrosum*, *Sphagna* (cuspidata), *Viola palustris*.

3. *Bryum pallens*, *Philonotis fontana*, *Sphagnum squarrosum*, *Sagina procumbens*. Overhanging shady banks—*Pellia sp.*, *Mnium hornum*.

Where the banks are low, zones 2 or 3 form flood shingles or terraces of sand and gravel. Thorough sorting and grading of these materials implies constant movement, and the surfaces are then very barren, but when the material is ill-sorted, consisting of gravelly sand and boulders, an open association of certain plants in the above two zones appears. The boulders are fringed with *Rhacomitrium aciculare*, and the protected sandy surfaces have patches with *Hylocomium squarrosum*, *Bryum pallens*, *Dicranodontium pellucidum* (occasionally), *Philonotis fontana*, *Rhacomitrium ericoides*, small forms of *Polytrichum*, *Sagina procumbens*, *Rumex Acetosa*, *Viola palustris*, and the alpines *Saxifraga stellaris*, *Alchemilla alpina*, *Epilobium alpinum*.

The limits of flooding and scour in these places is usually marked by a belt of *Nardus stricta*.

On ascending the burns till the waters are very peaty *Fontinalis* and *Scapania undulata* persist so long as there is a rocky substratum, but most of the other bryophytes disappear. *Fontinalis* occupies the pools, *Scapania* the better-lighted and aerated shallows.

Highly ferruginous springs often emerge from beneath the peat, and in some cases render the stream so irony that the ordinary aquatic vegetation is prevented from growing. The stones in the stream-bed are then sometimes completely covered with the beautiful little alga *Drapanaldia*, which looks blue-green against the red flocculent irony deposits, and waves continually in the stream like a matted spider-web. Every stone, and even the eroded peat surfaces have a slimy covering of the alga. As the waters become less ferruginous down stream the alga becomes displaced by mosses, especially *Fontinalis antipyretica*, which is the least exacting so far as the purity of the water is concerned.

The alluvial deposits consist of gravel and sand, derived from the sandy glacial drift, or of peat.

The alluvial surfaces fringing the stream channels nearest the points where the streams emerge from tunnels beneath the peat are formed of

large strips of the upper part of the peat, undermined, and lowered bodily *in situ*. They are generally smooth, but often have pools in cracks or sink holes in the surface.

The following sketches show the relations of these alluvial surfaces to the surrounding peat.

The plants originally occupying these undermined and lowered peat surfaces are soon replaced by associations in which either *Carex Goodenovii* or *Nardus stricta* are dominant, along with *Polytrichum commune* and *Viola palustris*. These are replaced later by grass-land, with *Anthoxanthum*, *Luzula multiflora*, *Agrostis tenuis*, and *Festuca ovina*, with *Potentilla erecta*, and *Hylocomium squarrosum*, but *Juncus squarrosus* is often dominant.

FIG. 2. –Stream channel in peat bog with slipped peat alluvium. The channel is still underground at one place.

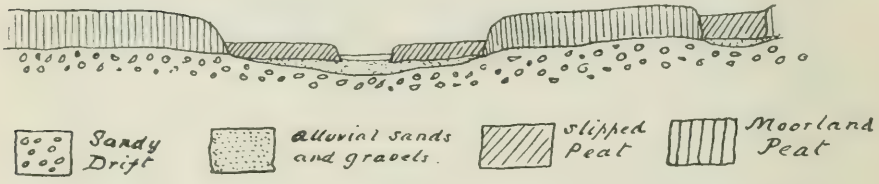


FIG. 3.—Diagrammatic horizontal section across a stream channel to show relations of moorland peat and slipped peat alluvia.

If the burn cuts deep enough to prevent flooding, the plants from the surrounding moorland may resume occupation.

Further down, where the stream channels are wider, we find, locally, extensive stretches of flood shingles which remain barren if the materials are well sorted and mobile. These flood shingles sometimes become colonised through the dumping of peat sods brought down the stream in flood and stranded on the shingle banks. The areas of shingle protected by sods thus become colonised by various species of the mosses, alpine plants, etc., already mentioned, and the sods become centres of dispersal for *Nardus stricta*, *Carex Goodenovii*, *Molinia cærulea* and *Polytrichum commune*. By a further accumulation of sods, and through the silting and levelling influence of floods the surface gradually becomes more even and eventually similar to those of the peat alluvia already described. *Viola palustris*,

Rumex Acetosa, *Galium saxatile*, and *Potentilla erecta* (Tormentil) are almost always present on these peat alluvia.

This erosion of peat, undermining and lowering of its surface, and dumping of sods, is constantly going on in the moorland streams. The eroded and scoured surfaces of peat along the flood margins always invite colonisation by *Nardus stricta*, while the lowering and dumping of peat rather favours *Carex Goodenovii*.

The more normal types of moorland stream alluvia, consisting of sand and gravel, are barely represented within this area. They carry subxerophytic types of grass-land similar to those described for Caithness. Those furthest removed from the lowlands have *Festuca vivipara* dominant along with *Anthoxanthum* and *Aira caespitosa*, var. *brevifolia*. A form of *Rumex Acetosa* (Sorrel Dock), *Taraxicum palustre* (Dandelion), *Alchemilla alpina*, and *Carduus palustris* are generally present, and these types show an approach to the alpine grass-lands of the flushed mountain slopes. Those in the peat of the plateau have associations more like those described for the peat alluvia, but generally have a greater variety of species.

Those nearest the present region of cultivation show *Veronica Chamaedrys*, *Bellis perennis* (Daisy), *Holcus lanatus* (Yorkshire Fog), and other migrants that are advancing up stream.

Such species are generally absent from the moorland stream alluvia, except where ponies or cattle have afforded a means of transference. Daisies are often quite abundant near the stables used for "stalking ponies" in the heart of the moorland, and also round springs where these ponies are taken to water.

VII.—Lochs and Dubh-lochans.

The shore of Gorm Loch Mòr plunges rapidly into deep water. In a few places where gravelly shallows occur, *Litorella* and *Isoëtes* grow on the bottom, and *Nitella opaca* occurs in rather deeper water. The larger stones are covered with *Nostoc* and *Ricularia* colonies, and sometimes *Drepanocladia*. Boulders on the shore of the lake have numerous mosses, including *Rhacomitrium fasciculare*, *Grimmia apocarpa*, *Ptilidium ciliare* (form approaching *pulcherima*), *Pleurygmandrum filiforme*, *Hypnum cupressiforme*, var. *tectorum*, *Brachythecum* sp. etc.

A few tow-nettings taken near the shore across several of the smaller inlets, in the month of June, showed hardly any plankton, very few algæ, some cyprids and daphnids, and floating colonies of flagellates.

Several of the corrie lochans in neighbouring areas show a sudden summer development of great quantities of a species of *Nostoc* just visible to the naked eye. It accumulates as a brilliant peacock-green paint-like covering on the stones, or forms a scum on the surface of the water on the lee shores. This development takes place annually in July, but was not observed in Gorm Loch Mòr. It only lasts a few days, and appears to mark a process of propagation and dispersal.

There have been numberless dubh-lochans in the peat of the Ben Armine district, but many have, unfortunately, been artificially drained,

with deplorable results so far as the beauty of the country and the distribution of the golden plover and dunlin are concerned.

The origin of these lochans was discussed in *The Vegetation of Caithness*.

In the Ben Armine district, as in Caithness, the dubh-lochans are often very barren of macroscopic flora, especially when they are subject to much wave action. Bogbean, *Juncus bulbosus* (floating type) and *Eriophorum polystachium* are commonly present, and *Carex rostrata* is occasionally encountered, but the last species is far more abundant in the low-lying dubh-lochans in the Baddanloch hollow to the north of the Ben Armine country, where it is sometimes associated with *Carex filiformis* and *Phragmites*, but in these cases the lochans occur in *Molinia* moors, where the waters contain more lime than on the high plateau.

The exposed dubh-lochans often show a sudden development of a brilliant, pale-green microscopic alga *Inefflegiata neglecta* which accumulates in quantities on the lee shores.

Those rather less exposed to wave action generally have the alga *Batrachospermum* growing in patches in the peat mud of the bottom. Small lochans may have flaccid masses of *Sphagnum*, but not floating types, including plumose forms of *S. cuspidatum* and a tumid form of *S. subsecundum* (var. *obesum*).

Squeezings from these mosses generally show an abundant microflora and fauna, including test-bearing rhizopods, rotifers, tardigrades, daphnids, ciliate infusoria, green turbellarians, and numerous desmids, and blue-green algæ, such as species of Chroococcus, Pediastrum, Gloeocystis, Merismopedia, Netrium, Gymnozyga, Arthrodesmus, Cosmarium, Euastrum, Staurastrum, Docidium, Gonatozygon, Tetnamorus, etc. (at least thirty species or forms were detected in a few samples subjected to microscopic examination). Diatoms are very scarce.

THE STORY OF THE FORTH.[1]

HAPPY is the country that has no history ; but fortunate is the district which has such a varied and interesting history as that of the Forth, and so sympathetic and competent a historian as the author of this handsome volume.

Mr. H. M. Cadell knows the Forth in all its phases, geological, geographical, and industrial, and he has himself made important original contributions to the elucidation of its geological history. In this volume he deals with some sections of its physical geology and its applied geography. He writes on the physical history of the Forth with the authority of an official expert, for he was engaged in its investigation as a member of the staff of the Geological Survey of Scotland. He has, moreover, travelled extensively, and the series of

[1] *The Story of the Forth.* By H. M. Cadell, M.A., B.Sc. Pp. xvii+299. 75 Illustrations and 8 Maps. Glasgow, 1913. Price 16s. net.

memoirs which he has contributed to the *Scottish Geographical Magazine* shows that he has been an alert and thoughtful observer of geographical processes in other lands.

The first chapters deal with the geological history of the Forth basin and with the evolution of the river, and they are mainly reprinted from Mr. Cadell's recent paper in this Magazine. The author here describes the evidence for his view that the Forth was formerly a much greater river which originally rose near Loch Fyne, and that the drainage of the upper part of the basin has been diverted to the Clyde, which has been steadily enlarging its area at the expense of the old Forth. This view was advanced in Mr. Cadell's well-known and suggestive paper on the Dumbartonshire Highlands, which initiated the discussion on the relations of the Clyde, Forth, and Tweed. The main points in the author's early conclusion have been generally admitted, though there is still some room for doubt as to some of the secondary questions. Thus a more complex history is assigned to the Forth by Drs. Peach and Horne; but even where the author's views have not been universally accepted, there is much to be said in their favour. The summary in Chapter VI. of the buried river valleys of the Forth basin is a valuable compilation of this scattered but instructive evidence. The last chapter on the physical geography relates to the old lochs around Edinburgh. The author describes several lochs which are no longer in existence, and explains why they have disappeared.

The latter part of the work is devoted to some branches of the economic history of the district, including a most interesting account of the Carron Company with its long and eventful career in which Mr. Cadell's ancestors played an important part. One chapter is devoted to the Scottish mineral oil industry. Mr. Cadell knows this subject intimately, as he mapped much of the oil shale field for the Geological Survey, and prepared the first edition of the official memoir on these oil fields. Mr. Cadell eulogises the scientific and industrial skill by which the oil shale industry has been developed, in spite of severe foreign competition, until its present annual output of waste shale exceeds, in bulk, the largest of the Egyptian pyramids. The industry is flourishing, but Mr. Cadell does not expect any considerable further extension of it "until a change takes place in the public attitude to the fiscal question, and more common sense with less of party politics comes into vogue," (p. 222). Mr. Cadell is very severe on our fiscal policy and regards its adherents as simple fanatics. The Standard Oil Company, the best known competitor of the Scottish oil industry, the author condemns as an "unscrupulous and relentless combination," without any recognition of the great debt which the oil industry and the public owe to that great corporation.

The last chapters in the work are devoted to land reclamation in the Forth valley. The author has for years taken a very keen interest in this subject, and gave important evidence before the Royal Commission on coast erosion. He then advocated the reclamation of nearly 3000 acres of land between Bo'ness and Grangemouth. He convinced the Commissioners that his scheme was worthy of further consideration and

expert investigation. His conclusions were opposed by Mr. Meik on both general and financial grounds. Mr. Meik objected that so extensive a reclamation would injuriously affect the Forth by diminishing the tidal scour. To these criticisms Mr. Cadell replies at length. His original scheme was to reclaim 2837 acres, but he now advances a smaller scheme for the reclamation of 1000 acres above Grangemouth. He feels, however, that there is little chance of such schemes being undertaken while land owners are injured "by unsympathetic or even positively malignant politicians."

The last chapter deals with the reclamation of moss lands. He describes Lord Kames' spirited action in clearing Blair-Drummond Moss by scouring off the peat, and thus exposing the good land below. The results of these early efforts appear to have been financially profitable, but land values are now so much lower, that the clearing of the land under present conditions might not be remunerative. Mr. Cadell makes the interesting suggestion that the effort to reclaim the land should be combined with utilisation of the peat. He points out that hitherto the attempts to use peat in Scotland, except as a local fuel, have been unprofitable; but he suggests that if the peat were so removed as to leave the ground ready for agriculture, then the value of the land gained might make the peat-working profitable.

Mr. Cadell's work is a very valuable contribution to Scottish geography, for it collects a great deal of scattered and useful information. He illustrates his views by many excellent maps, and sketches which are artistic, ingenious and instructive, and are beautifully reproduced. The book states the conclusions of an experienced geographer on many important problems to which its author has devoted years of careful observation and thoughtful study.

GEOGRAPHICAL NOTES.

Europe.

Place Names in Scotland.—Mr. J. Mathieson, the Convener of the recently revived Place-names Committee, sends us the following:—"The Committee held their second meeting in the Society's rooms on March the 28th, Dr. W. J. Watson in the chair. The chief business was the correct form and derivation of Beinn Iutharn, a hill on the watershed between the counties of Aberdeen and Perth, which Dr. J. Milne (*Place-names in Aberdeenshire*) derives from 'Bearn,' *a gap*, i.e. 'Beinn a' Bhearn,' *mountain of the gap*. The Committee concluded that there was no authority for Dr. Milne's derivation, but that the name was pronounced in Perthshire 'Iùrn' and on the Invereyside 'Iùrnan.' They also found that 'faobhar,' *an edge*, applied specially to the sloping part of a hill as seen against the sky, is pronounced in Perthshire 'fieur,' and they were on the whole of the opinion that the name means 'edge hill,' and should from a philological point of view be written Beinn Fhiùbharain, the 'ain' being a terminal suffix, or it may be a plural termination. They

considered the form as it appears on the O. S. Map, viz., Beinn Iutharn, a fair representation of the local pronunciation."

Rise and Fall of Turkish Power in Europe.—In connection with recent events in the Balkan Peninsula, it is of interest to note an article by Professor Nikolaus Jorga of Bukarest, which appears in *Petermann's Mitteilungen* for January, under the above title. The article is illustrated by an interesting series of maps, showing not only the varying boundaries of Turkey in Europe, since its greatest extension in the seventeenth century, but also the Bulgarian and Servian kingdoms at the period of their greatest extension. The accompanying article is historical in nature.

Asia.

Central and Northern Yunnan.—M. A. F. Legendre contributes to the December issue of *La Géographie* an account of his explorations in western China and Tibet, which includes some interesting facts in regard to the mode of life of the native and Chinese inhabitants of Yunnan. Both, it appears, subsist chiefly on maize, a curious fact as the cultivation of this cereal here cannot be of very ancient date. Red mountain rice is also grown, but on a small scale, and the other plants chiefly cultivated are buckwheat, millet, sorghum, tobacco and hemp. The millet and sorghum are not of great importance as food, their chief use being, at least so far as the Chinese are concerned, for the manufacture of spirit. On the other hand, tobacco and hemp bulk large in the estimation of the native. With the hemp fibre he makes a textile which, as it is loose-meshed and undyed, must present a close resemblance to sacking. It forms nevertheless the only native cloth, cotton, though highly prized, being a luxury. The Chinese and half-breeds, on the other hand, always use cotton, and have a great contempt for the native cloth.

In addition to the plants named various peas and beans are grown, including soya beans, while another leguminous plant, a species of Pachyrhizus, is cultivated for the sake of its tuberous root which is rich in starch. The ordinary "vegetables" of Europe, as spinach, cabbages, onions, carrots, turnips, etc., grow freely as winter crops, but winter cultivation is checked by the scarcity of rain then. Sugar cane and earth-nuts are also grown by the Chinese, and there is a certain production of fruit, such as kaki plums, oranges, the fruit of the jujube tree, pears, and a few chestnuts, but the stocks are poor and unimproved, and the people seem too inert to practise improved methods of agriculture or horticulture. Further, the Chinese have deforested the country almost completely, and surface erosion has consequently greatly increased, with a corresponding loss of soil on the slopes. Natural pasture is widespread, but though buffaloes, cattle, horses, asses, mules, goats and sheep are all kept, the number is small, the breeds poor, and the flocks produce little. Their milk is not utilised in any fashion.

The general lack of energy and initiative suggested by the methods of cultivation and the nature of the stocks both of plants and animals is apparently largely due to the prevalence of goitre. In the high valleys and plateaux dwarfs are frequent, and have been regarded as a pigmy breed, but, according to the author, they are merely crétins. Below about 6500 feet malaria also occurs, and the two diseases, with the enervating climate, probably account for the general listlessness.

The natives are cultivators and herdsmen and have practically no commerce or industries. The Chinese, on the other hand, in addition to these occupations, extract sugar from the sugar cane and oil from the earth-nuts; manufacture brandy; dye and weave the small amount of cotton grown; act as petty merchants; exploit the scanty remnants of the forests; and lend money to the cultivators. They have the greatest contempt for the natives, whom they characterise as "without faith and without law."

Currents in the Sea of Japan.—According to a note in *Nature*, the existence of circular currents in the Sea of Japan has recently been proved by Dr. Wada, the meteorologist of the Korean Government-General. The discovery is regarded in Japan as of great importance, both in connection with the distribution of marine life, and even with human migrations in East Asia. Dr. Wada's investigations were based upon the movements of mines laid in Vladivostock Bay during the Russo-Japanese war, and also upon the drift of 120 bottles, thrown from a steamer for the purpose. He believes that the results show that the Liman current, which runs down the coast of Siberia, flows southward past Kang-won and Ham-gyong provinces, Korea, as far as Cape Duroch. It then sweeps across to the coast of Echizen, Japan, and travels northward along the coast in company with the Tsushima current. One branch then goes out to the Pacific through the Tsugaru Strait, and another continues northward to Tartar Strait, where it joins the Liman current, thus completing the circle.

General.

The Royal Geographical Society's Annual Awards.—The following are the awards made for the current year by this Society. The Founder's Medal will not be awarded, but a casket, with a suitable inscription, will be presented to Lady Scott to contain the Patron's Medal and the special Antarctic Medal awarded to the late Captain Scott in 1904. The Patron's Medal is awarded to the late Dr. E. A. Wilson, while Lieut. Campbell is to receive a gold watch in recognition of the ability and good leadership displayed by him as commander of the Northern Party.

The Victoria Research Medal goes to Colonel S. Burrard, Surveyor-General of India, the Murchison Award to Major H. D. Pearson, the Gill Memorial to Miss Gertrude Lowthian Bell, the Cuthbert Peek Grant to Dr. Felix Oswald, and the Back Bequest to Mr. William S. Barclay.

International Geological Congress.—At this Congress, which is to be held at Toronto from August 7-14 of the present year, the principal subject for discussion is to be "The Coal Resources of the World," and a large monograph on the subject is being prepared by the committee. It is hoped that this monograph, which will consist of two quarto volumes and a folio atlas, will be ready for the meetings. Among the other subjects for discussion is—"To what extent was the ice-age broken by interglacial periods?" A fine series of excursions has been arranged in connection with the Congress, some of which will precede the meeting while others will follow it, and shorter excursions will also take place during the Congress week.

EDUCATIONAL.

Historical Development of Geographical Teaching in the United States.—Mr. Charles Dryer contributes to a recent issue of *The Journal of Geography* an interesting note on the development of secondary school geography in the States during the past century. In the earlier part of the nineteenth century the subject was in what he calls the "Gazeteer Stage," the books used giving mere descriptions of the salient features of the earth, with no attempt at scientific treatment except in the case of mathematical geography, taught by means of globes. Later this was replaced by the "Wonder Book" stage, when the books used in schools laid special stress upon striking and spectacular phenomena, such as earthquakes, volcanoes, etc. Such books were pious in tone, and found their natural development in Guyot's work (1873), which was an elaboration from the geographical side of Paley's argument from design. Such a sentence as that "the continents are made for human societies, as the body is made for the soul" sufficiently indicates the style. As the date of publication shows, Darwin had long before, in the *Origin of Species* (1859), undermined the basis of Paley's argument, and many of Guyot's purely geographical generalisations have as little permanent value as his philosophy. The new science and new philosophy found expression in Huxley's *Physiography*, which made the subject a general introduction to science, and paved the way for many books of similar type. But in the States the numerous striking discoveries of geologists, especially those connected with the Geological Survey, give a great impetus to physiography, considered as the science of land forms, and thus in a much narrower sense than Huxley's. A new terminology was elaborated, text-books multiplied and this specialised physiography apparently took hold of school teaching in a way which it has not done here. But as it has virtually become physical geology its study in the schoolroom is obviously beset with great difficulties, which even the fitting up of costly laboratories does not eliminate. Thus, within the last few years, this type of physical geography, in Mr. Dryer's opinion, is yielding before what he calls biogeography, or the relation of

living creatures to their environment. This involves the throwing overboard of a good deal both of the specialised physical geography of the American text-books, and even of physical geography in a less specialised sense. Mr. Dryer believes that stress is being more and more laid upon climates as a more important factor than relief in determining distribution, and also upon plant ecology as throwing light upon climate; economic geography is also being reorganised. Finally, in this new development stress is being laid upon human geography in a very wide sense, and this involves a development of regional geography on a basis of natural rather than political divisions. The new geography will thus be a blend of natural, technical, and social science.

NEW BOOKS.

EUROPE.

Baedeker's Northern Italy. Fourteenth Remodelled Edition.
Baedeker's Northern Germany. Sixteenth Revised Edition. Leipzig: Karl Baedeker, 1913. *Price* 8 *marks each.*

In these new editions the usual revision has taken place without, so far as we notice, any great modification. Both are stated to have the newer arrangement by which the book can be cut up into sections for those who do not care to carry the entire volume about. Personally we have not found the arrangement very satisfactory, and think that still further improvements along the same lines are required, though doubtless the technical difficulties are considerable. Otherwise the books show the long familiar and valuable features of their predecessors.

The Early Norman Castles of the British Isles. By Ella S. Armitage. Numerous Plans and Illustrations. London: John Murray, 1912. *Price* 15*s. net.*

The title of this work may seem to cover only a small subject, yet the mere enumeration of the English castles of the period with short notes occupies 157 pages, and in truth the castle-building labours of the Normans were on an enormous scale. With them it was a matter of deliberate policy, and, as a recent writer has remarked, "round these castles all the subsequent history of warfare in Britain turns for 400 years." But though this fact may be familiar to the general reader of history, it is not always realised that these places of strength of our Norman conquerors were merely erections of earth and wood. There were probably not more than four castles of stone erected by them in the eleventh century,—the Tower of London, Colchester, Pevensey and Bramber. The other constructions consisted of an earthen mound, most often artificial, surmounted by a palisade and tower of wood, and with a separate enclosure or bailey, the plan corresponding exactly with that of the stone castles which immediately succeeded them.

These castles are termed *motte*-castles by the author, from the Norman-French word, motte, meaning the hillock of a castle—well known to us in Scotland in the form moat. The term appears also as moot, signifying judgment (*cf.* Muthill or Moot-hill in Perthshire), since the site of these ancient castles continued often

to be the seat of feudal jurisdiction. Miss Armitage has expended many years of fruitful research in gleaning all that can be gathered concerning the design, purpose and history of these vanished fortifications, and the present work will receive the cordial encomiums of all students of the period, on which it throws fresh light. We can only hope that she may be enabled to give further attention to the castles of Scotland, in regard to which she and Dr. George Neilson have already done notable work, showing incidentally the extent of the Anglo-Norman occupation of the Lowlands. The book is a monument of erudition and at the same time most interesting reading.

Echoes from the Border Hills: being the Reminiscences of the late John Hyslop, J.P., Langholm. Edited by his son Robert Hyslop, F.S.A. (Scot.). Sunderland: Hills and Co.; Langholm: Robert Scott and Walter Wilson, 1912. *Price* 2*s.* 6*d. net.*

In our notice of *Langholm as It Was* in December last (*S.G.M.*, vol. xxviii. page 660), we expressed a hope that Mr. Robert Hyslop might be able to carry out his intention of publishing another volume of his father's reminiscences. He has now done so by the publication of *Echoes from the Border Hills*, which will probably receive as enthusiastic a welcome as the former volume. It contains a series of reminiscences illustrating the conditions of life in Eskdale before the days of railways and penny post, not to speak of motors and wireless telegraphy. The stories are pleasantly told in familiar and often humorous language, with no straining after effect, and will appeal to a wide circle of readers.

ASIA.

The Empire of India. By Sir Bampfylde Fuller, K.C.S.I., C.I.E. London: Sir Isaac Pitman and Sons, Ltd., 1913. *Price* 7*s.* 6*d. net.*

The publishers of the "All-Red Series" were fortunate in securing for their volume on India the services of Sir Bampfylde Fuller, whose experience of India is both recent and extensive. He has set about his arduous task with great care and assiduity, and has produced a very interesting volume of something less than 400 pages, which may fairly be entitled "Enquire within about everything Indian." It is a model of laborious and judicious condensation, and will, we trust, serve to whet the reader's appetite for other and more detailed works of which there are plenty, treating fully what Sir Bampfylde is only able to summarise. For example, the history of India from the most ancient down to recent times is sketched in 22 pages; to agriculture, and the vast majority of the 315 million inhabitants of India, are assigned only 19 pages; to commerce 20, and so on. The book is an encyclopedia, necessarily on a small scale, but packed with well-digested information and up to date; and incidentally it states some of the many perplexing and complicated problems connected with our Indian Empire and gives the opinions regarding them of one who by his training and experience is a very competent judge.

On the Track of the Abor. By Powell Millington. London: Smith, Elder and Co., 1912. *Price* 3*s.* 6*d. net.*

This little volume deals with the same tract of country and the same tribe of people as Mr. Hamilton's book reviewed on p. 49. It is racily written and can

easily be read at a sitting. It adds considerably to our knowledge of the hardships and inconveniences which a punitive expedition has to undergo on the remote North-Eastern Frontier of India, and gives an interesting account of the Abor's methods of cultivation. In the appendices come rough sketch-maps of Aborland, and a note on the course of the Tsanpo is given.

Bismaya; or The Lost City of Adab. By Edgar James Banks. New York and London: G. P. Putnam's Sons, 1912. *Price* 21*s. net.*

Dr. Banks was the leader of an expedition sent by the University of Chicago at the end of 1899 to explore Babylonian ruins, the objects found being destined for the Smithsonian Institution. Great difficulty was experienced in obtaining the necessary permission from the Turks, and after Dr. Banks had spent two and a half years in Constantinople his committee abandoned hope and were disbanded. Not long afterwards, however, permission was obtained to excavate, not at the site first chosen, but at Bismaya in the heart of Mesopotamia, and, financial backing being obtained, a start for the desert was made in October 1903, nearly three years after Dr. Banks' original departure from the States. A journey of six weeks brought him to the mounds of Bismaya, where excavation was begun on Christmas day. The rest of the book gives an account of the objects found, the progress of the excavations, and of the author's journeys in Babylonia.

The mounds were found to cover the ruins of Adab, a city already known from tablets, and the most striking object obtained was a white marble statue, some 32 inches high, with an inscription interpreted as meaning that it represents a king of the city. The author believes that there was here first a pre-Sumerian city, which was replaced by a fortified, temple-containing Sumerian city. This city was sacked by the Semitic king Sargon I., but came again into the hands of the Sumerians before its final destruction. Large numbers of objects of all kinds, including clay tablets, gold, copper and ivory objects, as well as remains of temples, palaces and private houses were unearthed, and of these the author gives interesting accounts. Incidentally also he casts much light upon present conditions of life in Mesopotamia. The book is profusely illustrated, and is written for the general reader.

Monumental Java. By J. F. Scheltema, M.A. London: Macmillan and Co., 1912. *Price* 12*s.* 6*d.*

The author seems to have lived in Java at intervals from 1874 to 1903, and he has endeavoured in this book to describe the monuments in their proper setting, their relations to natural scenery and native civilisation. As he himself points out in a rather long preface, he "sets up no pretence at completeness; there is no full enumeration of all the Hindu and Buddhist temples known by their remains; there are no measurements; no technical details, and no statistics."

Even in 412 or 413 when the Chinese pilgrim Fa Hiem visited Java, Brahmanism seems to have made considerable progress in the island, though Buddhism was not much in evidence. From 778 to 928 A.D. (according to the author), the fine Buddhist temples of Boro Budoor, Mendoot, and others seem to have been erected. About 1400 A.D., the Arabs introduced "the Islām" (*sic*) into Java, and most of the island seems to have been converted or enthralled by 1490 A.D.

After a short introductory chapter on the country, the people and their work, the author describes a few of the monuments in West, Central, and East Java, but the last three chapters deal with the Boro Budoor temple, of which there are several photographs.

The author is clearly an enthusiast, and there are passages in the book which are not only beautiful, but reveal an unusual sympathy with the devout spirit and inner meaning of the ancient Javanese builders. But there are several things which interfere with a comfortable enjoyment of the book. The author is always "dwelling on the tenebrous general aspect of governmental archæology in the past." We hold no brief for the Dutch government, but we suspect that Mohammedans had more to do with the destruction of the monuments than he supposes and in any case one coherent chapter of scathing invective would have pleased the reader better than perpetual complaints.

The incessant use of Hindu or Javan expressions, and the abundance of quotations (in Latin, Greek, French, German, Italian, Spanish, etc.), tend to disturb the main argument. The author's spelling is also eccentric (Sooltan for Sultan, Islām). Why also should a volcano be so often or always described as a fire-mountain?

These are unfortunate defects, for any one visiting Java who has already a working knowledge of Buddhism might find great pleasure in the author's descriptions.

AFRICA.

The Adventures of an Elephant-Hunter. By JAMES SUTHERLAND. London: Macmillan and Co., Limited, 1912. *Price* 7*s.* 6*d. net.*

Mr. Sutherland has certainly had a varied and adventurous career. He went out to Africa in 1896, and, since then, has roamed about the Transvaal, Matabeleland, Mashonaland, British Central Africa, Lake Tanganyika, the Congo, Portuguese and German East Africa, earning a living by "nigger-bossing," contracting for railways, acting as agent for trading companies, keeping native stores, prize-fighting, and volunteering with the Germans to put down an insurrection. But his heart was in none of these occupations. He is a sportsman, and during ten years has shot 447 bull elephants, besides females, for which he claims a world's record, which we imagine no one will care to dispute with him. In this volume he gives us a series of thrilling and exciting stories of his adventures in pursuit of elephants, man-eating lions, etc. He had no European companions, and had to trust to his own skill and prowess in many a tight place. He scouts at the idea of a speedy extermination of the big game in Africa, telling us that in addition to the many game reservations "there are thousands of square miles of quite uninhabited country in which there are hundreds of thousands of elephants and every other kind of game, with the exception, perhaps, of giraffes." He was equally unorthodox as to his potations during his expeditions, drinking a stiff whisky and soda after his day's work, half a bottle of port at dinner, and one or two strong whisky pegs ere he went to sleep.

Dawn in Darkest Africa. By JOHN H. HARRIS. London: Smith, Elder and Co., 1912. *Price* 10*s.* 6*d. net.*

Before he published this very interesting book, Mr. Harris did a very astute thing. He selected his own reviewer, and he made the happy selection of Lord Cromer, whose authority as a diplomat, a statesman, and a man of affairs is indisputable. Lord Cromer has contributed an introduction, which is neither more nor less than an able and elaborate review, from the conclusions of which it would be rash and risky to differ. The Dawn in Africa, which is the subject-matter of the book, is not the dawn in political or economic history of centuries ago. It is

the dawn which is of quite recent origin, confined practically to the area of the Congo and colonies round the Gulf of Guinea, and the result of the lurid light thrown on the condition of the natives from various sources, notably missionaries, who, by exposing the horrors of the Congo and the Portuguese protectorates, have compelled the attention of Europe to Equatorial Africa, and have thus inaugurated a more hopeful and beneficent era for vast regions of territory, the populations of which were rapidly approaching extinction. Mr. Harris describes the miseries of the inhabitants of the Congo under the Belgian régime and those of the inhabitants of Angola, San Thomé, and Principe under the Portuguese administration, with the vivacity and earnestness of him who has a personal, recent, and extensive experience of them, and at the same time he does not conceal the few good points in these administrations, nor does he evade the very serious difficulties inevitably incidental to a change of system. He has many shrewd observations to make on the British, French, and German administrations, to each of which he plays the invidious and at all times unpleasant rôle of the candid friend. In this respect he has, indeed, little or nothing to tell us that is new, for the faults and deficiencies of administration in their African territories are notorious and are frankly acknowledged by French and German writers. He does not hesitate to plunge into *la haute politique*, and suggest, if he does not propose, a rearrangement of the map of Equatorial Africa, a proceeding in which it is needless to say he does not receive much encouragement or assistance from the experienced and cautious diplomat Lord Cromer. Much more useful and instructive are his notes and observations on the natural resources of the territories, *e.g.* oil palms, rubber trees, cocoa cultivation, and the like, which well merit the earnest attention and study of statesmen as well as of merchants. Mr. Harris is a missionary, obviously profoundly convinced that the true hope of Africa lies in the spread of Christianity and in the raising of the level of character both of Europeans and natives, but he sees the serious hindrances and difficulties, and in no way minimises them. Indeed, his remarks on some of them, notably on polygamy, show a candour, liberality of thought and charity which we do not often meet with in missionary writings. We cordially recommend this book to the perusal of our readers, agreeing with the high encomium of Lord Cromer, that no one has ever brought a more evenly balanced mind to bear on the numerous problems which perplex the African administrator than Mr. Harris, whose "enthusiasm is tempered by reason and by a solid appreciation of the differences between the ideal and the practical."

AMERICA.

The Putumayo: The Devil's Paradise. By W. E. Hardenburg. London: T. Fisher Unwin, 1912. *Price* 10*s.* 6*d. net.*

It seems but a short time ago since the moral sense of the civilised world was shocked by the disclosure of atrocities and horrors connected with the rubber traffic in the Belgian Congo, and now, in the volume now before us, we have a disclosure of prolonged brutality and cruelty in South America, rivalling, but certainly not exceeded by, anything which occurred under the Leopoldian régime. A deplorable feature of the affair is that the atrocities were committed by the agents of a company among the directors of which are English gentlemen high in rank in the social and commercial world. As we now write, their personal innocence or guilt is the subject-matter of a formal trial, so it would be most improper to express any opinion on that subject. Suffice it to say, that no condemnation and no punishment could be too severe for a government or a company

who were aware that their agents were committing one tithe of the crime which is laid to their charge in this book and in the documents by which it is supported, crime by which a peaceful, docile, amiable race has been almost extirpated under circumstances of indescribable brutality. The geographical interest in the book lies in the description it gives of a very adventurous, and, in the end, disastrous journey over the Andes down to the Putumayo River by W. E. Hardenburg and his companion, W. A. Perkins, who, apparently, were prospecting for rubber and were prepared to invest money in any concern that promised good profits. Hardenburg has a pitiful story to tell of his misfortunes and bad treatment, when he reached the regions which were being exploited by the Peruvian Amazon Company, for the details of which we must refer the reader to the book. Incidentally Hardenburg has much interesting information to give us as to the conditions of life in the forest, the flora and fauna he found there, the Indian tribes, and more especially the Huitotos, their houses, dress, weapons, superstitions, domestic customs, means of livelihood, and the incredibly inhuman treatment they have been receiving at the hands of the agents of the Peruvian Amazon Company, owing to which a population estimated to have numbered some forty to fifty thousand a few years ago has been reduced to under ten thousand. The Putumayo is an affluent of the mighty Amazon. Its source is near the town of Pasto in Southern Columbia, and it has a course of over a thousand miles ere it enters the Amazon. The region described by Mr. Hardenburg lies for the most part between the Putumayo River and its effluent the Igara-Parana, and Mr. Reginald Enoch, an indisputable authority, who contributes an elaborate and incisive introduction to this book, describes it as "an extremely outlying part of Peru with corresponding difficulties of access and governance," and he confirms from his own knowledge much of what Mr. Hardenburg describes. The object of the book is undoubtedly an indictment against the Peruvian Government and the Peruvian Amazon Company, but in addition it is a distinct contribution to our knowledge of the natural history, anthropology, and geography of a little known but interesting tract of South America.

The Conquest of New Granada. By Sir Clements Markham, K.C.B., D.Sc. (Cam.). London : Smith, Elder and Co., 1912. *Price 6s. net.*

Mr. Bryce in his recent book on South America says, "When the Spaniards came to the New World, they came mainly for the sake of gold. Neither the extension of trade, the hope of which prompted the Dutch, nor the acquisition of lands to be settled and cultivated, thereby extending the dominion of their crowns, which moved most of the English and French, nor yet the desire of freedom to worship God in their own way, which sent out the Pilgrims and Puritans of New England—none of these things were uppermost in the minds of the companions of Columbus and Ponce de Leon, of Vasco Nuñez and Cortes and Pizarro. No doubt they also desired to propagate the faith, but their spiritual aims were never suffered to interfere with their secular enterprises." Probably, it is no exaggeration to say, that were we to search the whole course of the history of Spanish doings in America, we would not find a more striking illustration of the truth of Mr. Bryce's remarks than in the episode so gracefully and spiritedly told by Sir Clements Markham in the volume now before us. The conquest of New Granada, *i.e.* the modern republic of Columbia, took place in the first half of the sixteenth century. Several Spanish *conquistadores* took part in it, but the actual subjugation of the Chibchas will go down in history as the work of Gonzalo Jimenes de Quesada (who started life as an advocate in Granada in Spain) in his expedition

in the years 1536-8. Sir Clements makes out the best case he can for Quesada, but he is fain to confess that "Quesada had arrived in the country of the Chibchas and found wide plains and beautiful valleys, thickly peopled by an industrious and intelligent race. He found an advancing civilisation guided by two sovereigns of ancient lineage, with a third sacred personage acting as arbitrator and peacemaker. He found chiefs and people happy and contented. When he departed all was changed. There was confusion and terror, cultivation neglected, some of the people in flight, others forced to work as slaves. He had killed two sovereigns, tortured another to death. Destruction had come upon Chibcha civilisation, and desolation brooded over the once prosperous land. True: but Quesada was taking home a box containing 758 emeralds for the emperor Charles v." A Spanish annalist, referred to by Mr. Bryce, states that within twenty years after the arrival of the Spaniards, the Chibchas, who had numbered nearly a million, were almost annihilated. Sir Clements has done good work in collecting together what is known of the Chibcha civilisation, their religion, language, calendar, system of government, etc., but he indicates that his work is by no means exhaustive, and he hopes that some other author will tackle the subject again. We may be permitted to echo the hope, and to add our hope that the author of the future will be endowed with the same patience, industry, lucidity and good judgment as the veteran president of the Hakluyt Society.

GENERAL.

Dans l'Atlantique. Par Henri Dehérain. Paris: Hachette et Cie, 1912. *Price* 3 *fr.* 50.

St. Helena has been immortalised as the prison of Napoleon, but in this book M. Dehérain describes the island as it was during the seventeenth and eighteenth centuries. No European Power occupied it till 1659, when it was taken possession of by the English East India Company, which received in 1661 a royal charter from Charles II. This conquest was resented by the Dutch East India Company, which, profiting by the war between the United Provinces and Charles II., the ally of Louis XIV., sent a fleet from the Cape of Good Hope in 1672 and captured the island. Next year, however, the island was retaken by a British fleet under Richard Munden, who received a reward of £2500, and was knighted by Charles II. A second royal charter was granted to the English East India Company, which administered the island for the next one hundred and sixty-one years.

A French vine grower named Etienne Poirier lived for thirty years in St. Helena, being employed by the company in cultivating the vine and producing wine and brandy. Owing to a revolt, during which the governor was murdered, Poirier, who had shown great courage, was appointed lieutenant, and in 1697 governor of the island. A Huguenot, he proved a strict administrator, repressing drunkenness and insisting on Sabbath observance. In 1706, under his very eyes, two of the company's ships were seized by two French men-of-war commanded by Des Augiers, and carried off to Brest. Poirier was greatly blamed by the company, and died in the following year. Slaves formed a large proportion of the population of the island, as many as fifteen hundred and forty being there in 1817. They were subject to such severe rules and punishments, that they often committed suicide or fled to the interior of the island or escaped by sea. Gentler treatment began in the eighteenth century, and at last, in 1833, the emancipation of slaves was decreed throughout the British empire.

The remainder of the volume (which is illustrated by maps) is devoted to

descriptions of Tristan Da Cunha (the correct spelling), the coasts of South Africa, and the voyages of Auguste Broussonet to Morocco and the Canaries. The author mentions that Captain Dugald Carmichael, R.N., was the first European to describe the central peak of Tristan Da Cunha, which he ascended in 1817, afterwards contributing a scientific paper on the island to the Linnean Society of London. The mountain he ascended is the nesting-place of the great sea-birds of the Atlantic.

BOOKS RECEIVED.

The Age of the Earth. By Arthur Holmes, B.Sc., A.R.C.S. Illustrated with 20 Figures and Diagrams. Fcap. 8vo. Pp. xii + 196. London: Harper Brothers, 1913. *Price* 2*s.* 6*d. net.*

Wayfaring in France: From Auvergne to the Bay of Biscay. By Edward Harrison Barker. 8vo. Pp. xv + 540. London: Macmillan and Co., Ltd., 1913. *Price* 7*s.* 6*d. net.*

The Continents and their People. Asia: A Supplementary Geography. By James Franklin Chamberlain, ED.B., S.B., and Arthur Henry Chamberlain, B.S., A.M. Cr. 8vo. Pp. ix + 198. Macmillan and Co., Ltd., 1913. *Price* 3*s.*

The Land of the Peaks and the Pampas: South America of Yesterday and To-day. By Jesse Page, F.R.G.S. With a Map and 18 Illustrations from Photographs. Cr. 8vo. Pp. xv + 368. London: The Religious Tract Society, 1913. *Price* 3*s.* 6*d. net.*

Modern Chile. By W. H. Koebel. With Illustrations and Map. Demy 8vo. Pp. x + 278. G. Bell and Sons, Ltd., 1913. *Price* 10*s.* 6*d. net.*

A History of the Colonisation of Africa by Alien Races. By Sir Harry Johnston, G.C.M.G., K.C.B. With 8 Maps. New Edition, revised throughout and considerably enlarged. Cr. 8vo. Pp. xvi + 505. Cambridge University Press, 1913. *Price* 8*s. net.*

Changing Russia. By Stephen Graham. With 15 Illustrations and a Map. Demy 8vo. Pp. ix + 309. London: John Lane, 1913. *Price* 7*s.* 6*d. net.*

The Land of the New Guinea Pygmies: An Account of the Story of a Pioneer Journey of Exploration into the Heart of New Guinea. By Captain C. G. Rawling, C.I.E., F.R.G.S. With 48 Illustrations and a Map. Demy 8vo. Pp. xvi + 366. London: Seeley, Service and Co., Ltd., 1913. *Price* 16*s. net.*

The Norfolk Coast and The Suffolk Coast. By W. A. Dutt. Illustrated. Cr. 8vo. Pp. 413. London: T. Fisher Unwin, 1909. *Price* 6*s. net.*

The Cornwall Coast. By Arthur L. Salmon. Illustrated. Crown 8vo. Pp. 384. London: T. Fisher Unwin, 1910. *Price* 6*s. net.*

The Geography and Geology of South-Eastern Egypt. By John Ball, Ph.D., D.Sc. Demy 8vo. Pp. xii + 394. Cairo: Survey Department, 1912.

Anthropological Report on the Ibo-speaking Peoples of Nigeria. By Northcote W. Thomas, M.A., F.R.A.I. Demy 8vo. Part I.: *Law and Custom of the Ibo of the Awka Neighbourhood, S. Nigeria.* Pp. 161. Part II.: *English-Ibo and Ibo-English Dictionary.* Pp. viii + 391. Part III.: *Proverbs, Narratives, Vocabularies, and Grammar.* Pp. vi + 199. London: Harrison and Sons, 1913.

Mozambique: Its Agriculture and Development. By Robert Nunez Lyne, F.L.S., F.R.G.S. Illustrated. Demy 8vo. Pp. 352. London: T. Fisher Unwin, 1913. *Price* 12*s.* 6*d. net.*

The North Pole and Bradley Land. By Edwin Swift Balch. Royal 8vo. Pp. 91. Philadelphia: Campion and Co., 1913.

Are the Planets Inhabited? By E. Walter Maunder, F.R.A.S. Fcap. 8vo. Pp. 166. London: Harper Brothers, 1913. *Price 2s. 6d. net.*

Twentieth Century Jamaica. By H. G. de Lisser. With Illustrations. Demy 8vo. Pp. 208. Kingston: Jamaica Times, Ltd., 1913.

Le Pérou Économique. Par Paul Walle. Préface de M. Paul Labbé. Un fort vol. in-8°. Illustr. et carte hors texte, broché. Pp. xvi + 388. Paris: E. Guilmoto, 1913. *Prix 9 fr.*

Ravenna: A Study. By Edward Hutton. Illustrated in Colour and Line. By Harald Sund. Demy 8vo. Pp. xii + 300. London: Dent and Sons, Ltd., 1913. *Price 10s. 6d. net.*

Big Game Shooting in India, Burma, and Somaliland. By Col. V. M. Stockley. Royal 8vo. Pp. xii + 282. London: Horace Cox, 1913. *Price 21s. net.*

The Berwick and Lothian Coasts. By Ian C. Hannah. With 65 Illustrations. By Edith Brand Hannah. Demy 8vo. Pp. 368. London: T. Fisher Unwin, 1913. *Price 6s. net.*

The Passing of the Turkish Empire in Europe. By Captain B. Granville Baker. With 33 Illustrations and a Map. Demy 8vo. Pp. 335. London: Seeley, Service and Co., Ltd., 1913. *Price 16s. net.*

Camp and Tramp in African Wilds: A Record of Adventure, Impressions, and Experiences during many years spent among the Savage Tribes round Lake Tanganyika and in Central Africa. With a description of Native Life, Character, and Customs. By E. Torday. With 45 Illustrations and a Map. Demy 8vo. Pp. xvi + 316. London: Seeley, Service and Co., Ltd., 1913. *Price 16s. net.*

Geography of Missouri. By Frederick V. Emerson. Demy 8vo. Pp. 74. Columbia, 1912.

The Timber, Agricultural, and Industrial Resources of Vancouver Island, British Columbia. Pp. 44.

Preliminary Report on the Field Experiment upon Cotton carried out at Talbia, Egypt, 1912. Pp. 10. Cairo, 1912.

Report on the Administration of Coorg, 1911-12. Mercara, 1912.

Report on the Administration of Bangalore, 1911-12. Bangalore, 1912.

Report on the Administration of the Punjab and its Dependencies, 1911-12. Lahore, 1913.

Report on the Administration of the United Provinces of Agra and Oudh, 1911-12. Allahabad, 1912.

Diplomatic and Consular Reports.—Report on a Journey in the South of Brazil (684); Report on the Leased Territory of Liaotung Peninsula (5042); Report on the Trade and Resources of the Congo, 1911 (5043); Report of Trade of Amsterdam, 1912 (5044); Trade of Constantinople, 1912 (5045); Trade of Goa, 1911-12 (5046); Trade of Swatow, 1912 (5051); Trade of Rio de Janeiro, 1911-12 (5049); Trade of Ispahan, 1912 (5048).

Colonial Reports.—St. Lucia, Report for 1911-12 (752).

Publishers forwarding books for review will greatly oblige by marking the **price** *in clear figures, especially in the case of foreign books.*

THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

DAVID LIVINGSTONE:

A Review of his Work as Explorer and Man of Science.[1]

By Sir Harry Johnston, G.C.M.G., K.C.B.,
Livingstone Gold Medallist, Royal Scottish Geographical Society.

(With Map.)

David Livingstone, it is scarcely necessary to remind you, was of Highland descent, his grandfather having been a crofter on the little island of Ulva, off the west coast of the larger island, Mull. In appearance he showed clearly that the predominant strain in his ancestry was what we call Iberian for want of a more definite word. That is to say, that he was of that very old racial strain still existing in Western Scotland, Western Ireland, Wales, and Cornwall, which has apparently some kinship in origin with the peoples of the Mediterranean, and especially of Spain and Portugal. Indeed, according to such descriptions as we have of him (notably that by the late Duke of Argyll), and such portraits as illustrate his appearance, he was not unlike a Spaniard, especially in youth and early middle age. His height scarcely reached to 5 feet 7 inches, his hair and moustache, until they were whitened with premature old age, were black, his eyes hazel, his complexion much tanned by the African sun, but at all times inclining to sallow. He possessed a natural dignity of aspect, however, which never failed to make the requisite impression on Africans and Europeans alike. Bubbling over with sly humour, with world-wide sympathies, and entirely free from any narrowness of outlook, he possessed a very strong measure of

[1] The Livingstone Centenary Address, delivered before the Society in Edinburgh on March 27, 1913.

self-respect, coupled with a quiet, intense obstinacy of purpose. In earlier life he was so eager to advance the bounds of knowledge, and so certain that he was a predestined and appointed agent to accomplish great purposes, that he may have been slightly arrogant and contemptuous towards fools and palterers.

Livingstone succeeded in a measure to the work of exploration already commenced in the first quarter of the nineteenth century by men like Campbell, and Moffat, Dr. Philip, Edwards, Archbell and Melvill. Of such pioneers, including Livingstone himself, James Chapman, one of the greatest and most widely travelled of South African explorers, subsequently wrote in 1855: "Their labours were difficult, their trials many, their earthly reward was a bare subsistence. I believe that the real causes of dislike to the missionaries in South Africa are the avarice of trade, and jealousy of the influence they possess, and the check they are upon those who would like to exercise an arbitrary and unjust authority over the natives. I could say a great deal more on this subject; but the missionaries are a class of men, generally speaking, so irreproachable, that the scandals of the unprincipled cannot affect them with well-thinking men; nor do their characters require any further defence by me."

As an estimate which is one of unmitigated praise generally defeats its object and provokes a reaction of dislike, I have sought diligently to record all the aspects and details of the character and acts of David Livingstone which could be gathered from the remembrance of contemporaries (European, Arab, and Negro), or could be found in books and letters, and in my conclusions, based on this evidence, I have been careful to mention any points in disparagement of Livingstone for which there was any foundation. But, as a matter of fact, this research leaves me unable to quote anything of importance which could be regarded as serious dispraise of this remarkable man, whose life was saintly, whose disposition was naturally noble, yet full of attractive charm. On the other hand, a frequently repeated reading of his works leave me increasingly astonished at his achievements with the means that he possessed, and more than ever convinced that he was so far the greatest of African explorers, judged not only by his actual achievements, but by his character, disposition, and mental capacity.[1] He wrote things, he expressed ideas in the forties, fifties, and sixties of the last century which seem to those who read them to-day singularly modern as conceptions, conclusions, and lines of profitable study. For instance, apart from his boyish passion for geology and the records of the rocks, and his feeling that

[1] Besides getting himself taught on board ship, and later by Sir Thomas Maclear, to take with great accuracy astronomical observations for fixing latitude and longitude, besides acquainting himself with botany and geology, with patristic literature and Egyptology, Livingstone was an excellent mechanic, a steersman and a mariner. His resourcefulness was at all times remarkable. When he was hard up for fuel on his first steamer journey up the river Shiré he landed in the Elephant marsh. Here no trees existed and no fuel was obtainable, but his men found many bones of slaughtered elephants. Livingstone at once took the bones on board, burnt them in the furnace of the *Ma-robert*, and so continued his journey.

here lay before us a new and much vaster Bible, he had only just attained manhood when by dint of reading he begins to express his conviction that Christian missionaries were going to produce not only the awakening but the renaissance of China, an eventuality which has now come to pass. Scarcely landed in South Africa, he conceives the idea, barely formulated then, of the far-spreading affinities of the Bantu peoples, and the possibility through this community of language of carrying British missionary work and British political influence up through the centre of Africa to Abyssinia. He also, fifteen years afterwards, grasped the important fact before any other explorer of Africa, that the part of the continent white men should make for in their settlements was the high plateau region of the interior rather than the banks of the great rivers or the seaboard.

Indeed, it requires very little accentuation of his opinions expressed in private letters in 1841, to formulate the phrase, since so potent, of "The Cape to Cairo." He never lost sight of this ideal, and during his last years speculated on its ultimate achievement through the work of Sir Samuel Baker on the Mountain Nile and the Albert Nyanza. It was only when Stanley chilled these anticipations by informing him that Great Britain had lost her influence in African problems, and that it was perhaps the United States which was going to re-organise Egypt through the loan of American officers, that Livingstone's ideals now transcended the limitations of national politics. In his journal on May 1, 1872, just one year before his death, he wrote the celebrated words which have been recorded on his tombstone, "All I can add in my loneliness is, may Heaven's rich blessing come down on every one, American, Englishman, or Turk, who would help to heal the open sore of the world."

Yet he was under few illusions about the negro and his inherent weakness as a self-governing race: "The evils inflicted by the Arabs are enormous, but probably not greater than the people (the negroes) inflict on each other," is one of his mature conclusions. Of all the tribes with whom he came into contact, he was most indulgent towards the Makololo —the Basuto governing caste in Upper Zambezi. This, no doubt, was at first due to his personal admiration for Sebituane, the great Makololo conqueror, who may be said to have thrown open Zambezia to Livingstone's penetration. Secondly, Livingstone was deeply grateful to his Makololo followers for so faithfully escorting him, first to Angola and later to Tete. Yet it is evident that the Makololo had made themselves detested by the natives of the Zambezi Basin. "If the people have cattle," it was said, "the Makololo kill them for their cattle's sake; if they have not, they kill them for their children (to be sold as slaves): if they have neither, they kill merely to kill." And according to James Chapman, who visited this region whilst Livingstone was making his great journey from the Upper Zambezi to Angola, the Makololo, after Sebituane's death, were not so much impressed by Livingstone as a missionary teacher as by his skill in medicine and surgery.

"Livingstone," wrote Chapman, "being a doctor, has also the reputation of being a wizard. This makes him either feared or admired, and gives him a certain influence. They give him credit for being a good

doctor, and say he has cured many, but killed some natives. They do not believe in natural deaths: when a man dies, he has been killed. By all accounts the doctor's preaching is barely tolerated by the chief, who is at heart highly displeased at his doctrines concerning rain and polygamy. The people say that Dr. Livingstone has promised them all the good things of this earth—rain, corn, cattle, etc.—if they would believe in God and refrain from polygamy, slavery, and other malpractices: that they have waited a long time for these good things: and that they would wait another year to see if the Good Man he talked about helped them nicely (*tusa sinthe*). While they were relating these things, and conversation grew slack, the councillor Punoani was observed sitting with a piece of newspaper upside down, mimicking the doctor singing a hymn, and, observing that he had attracted our attention, he rolled over on his back, threw his feet into the air, and exclaimed, bursting out into a loud laugh of ridicule, 'Minari' (a corruption of the Dutch mynheer, generally applied to missionaries). Such is the sort of impression as yet made on these barbarians. It is to be hoped that in time better success will attend missionary efforts."

Livingstone's last seven years' explorations of South-Central Africa brought home to him the devastation of Africa by the negro peoples and their internecine wars. He records in 1866 his impression that a good deal of the Yao country between the Ruvuma and Lake Nyasa once supported a prodigious iron-smelting and grain-growing population. The land was marked with the ridges in which they formerly planted their crops and from which they drained off the too abundant moisture of the rains, while the ground was strewn with pieces of broken pots. Internecine wars had led to famine and depopulation, yet the surviving Yao tribes had invaded the lands of the A-nyanga and Alolo, and (wrote Livingstone) Yao raids in the middle nineteenth century for the supply of Arab caravans almost depopulated the fertile tracts to the south-east of Lake Nyasa. The evidence of Livingstone and other travellers of the fifties, sixties, and seventies, brings home to us the widespread devastation caused by bands of Angoni-Zulus. These Zulu raids over East-Central Africa during the nineteenth century were one of the greatest disasters of its history. They had their origins in the convulsions caused in Natal and Zululand by the conquests of Chaka the Destroyer, and their efforts long remained written on the surface of Nyasaland, North-east Rhodesia and German East Africa.

"It was wearisome to see the skulls and bones scattered about everywhere; one would fain not notice, but they are so striking that they cannot be avoided," is an extract from Livingstone's journal as he comes in contact with the Angoni raids in South-west Nyasaland. As he begins to leave the basin of the Upper Luangwa for the unknown Bemba regions beyond, he notices the uninhabited condition of the country due to the slave raids of the Awemba; a fresh factor in African history. The Awemba or Aba-emba did not come from the south like the Zulus, but from Congoland, and their irruption into South-Central Africa was one of the results of great tribal disturbances there due to the conquests of the Sudanese Bushongo. Livingstone writes in December, 1866: "I

shall make this beautiful land (North-east Rhodesia) better known, which is an essential part of the process by which it will become the pleasant haunts of men. It is impossible to describe its rich luxuriance, but most of it is running to waste through the slave-trading and eternal wars."

Yet while condoling with the Mañanja survivors from the Yao slave-raids in Nyasaland, he was asked by the men amongst them for guns and powder, not to defend themselves only, but so that they might imitate the Yao and go slave-raiding; and he noted in 1866 that the much-harried A-chewa people, instead of loathing the Mazitu, or "wild-beast" Angoni Zulus for their raids, admired them and strove to dress-up their young men like them.

Livingstone's description of the horrors of the slave-raids and the slave-trade in Eastern Congoland are too well known to need quotation in order to convince you that the Central Africa he knew merited his pity and his appeal for intervention. Of course not all the Arabs were ruthless murderers and slave-raiders. Tipu-tipu (whose acquaintance he made in 1867), and some others were only ivory-traders, though they made use of slave-porters. Livingstone's attitude towards slavery and the slave-trade we now know to have been a perfectly reasonable one, based quite as much on a far-sighted appreciation of the economic importance of free labour in Africa as on an equally far-sighted instinct of philanthropy. He criticised severely, but not unjustly, the Dutch-speaking colonists of South Africa for their treatment of the Bechuana and Bushmen; the Portuguese for their acquiescence or participation in the Central African slave-trade; his own Government for lack of zeal in regard to the repression of the slave-trade at Zanzibar (I am referring to the sixties of the last century); and the Arabs—whose nobility of disposition he was well able to appreciate where it was manifest—for the misuse of the power they had acquired in the region of the great lakes.

In the middle of the nineteenth century we find him writing quietly to deprecate the butchery of big game which was beginning to rage in Central South Africa. Some of these gentlemen-hunters he denounced as "itinerant butchers," and he points out that so far from their reckless slaughter of wild beasts earning for them a high position in the regard of the natives, they were often regarded with a certain amount of contempt.[1] Yet if it were necessary for the protection of human life, or other reasonable human needs, such as hunger, or for the enlargement of scientific knowledge, he could handle a rifle and a shot-gun nearly as well as any one of his sportsmen friends; and that he was a thorough sportsman in

[1] Many sportsmen-travellers in Africa (wrote Livingstone) have recorded with satisfaction in their books what a high position they occupied in the regard of the natives for their prowess in shooting big game, yet Livingstone, who so often heard and understood exactly what the Bechuana people of these South-Central African hunting-grounds were saying, adds that the great hunters were regarded with a certain amount of contempt by the negroes whom they so lavishly supplied with meat. "Why do these men, who are rich and could slaughter oxen every day of their lives at home, come to our country and endure so much thirst for the sake of this dry meat, none of which is equal to beef? You say it is for play! But your friends are fools."

the best definitions of the word—what the Americans would call "a real white man"—is evident from the unqualified regard with which all the great sportsmen-naturalists and pioneers of South Africa expressed for him. Despite all rivalries in exploration, all attempts on the part of the malicious and the envious to sow discord between them, William Cotton Oswell, throughout his own unblemished career wrote and spoke of Livingstone in the highest terms, without any qualification whatever. The same was the case with Frank Vardon, Gordon Cumming (even though he may have winced at the reproof of his butchery), William Webb, Thomas Steele, and James Chapman.

But if he blamed and criticised, he was far readier to praise and thank. Those who have been so willing to underline his criticism of the Portuguese have omitted to place alongside it much that he recorded in their favour and many cordial expressions of thanks which he tendered them for their frequent assistance. "May God remember them in their day of need," he wrote in deepest gratitude for Portuguese hospitality and kindness at the crisis of his journey on the frontiers of Angola: and in another place, "The universal hospitality of the Portuguese was most gratifying as it was most unexpected. And even now as I copy my journal I remember it all with a glow of gratitude."

In very truth, but for the action of the Portuguese towards him when he reached the Kwango river from the Upper Zambezi, he might have perished and have been scarcely heard of in the history of Africa. He had only a small escort of scared Makololo, already frightened at their own boldness in travelling so far away from home: he was almost entirely without trade goods or provisions, ill and weak with semi-starvation and dysentery. The truculent natives on the east bank of the Kwango refused him a passage across the river, and avowed their intentions of seizing and enslaving his Makololo, while at him they had begun to fire their muskets. He would almost certainly have died from one cause or another at this juncture, but for the intervention of a Portuguese sergeant of militia on the west bank of the Kwango, who prevailed on the natives to ferry him across: and, once he had got him as a guest, treated him with every kindness and hospitality and sent him forward, safe and well provisioned, to finish his journey to the Atlantic coast. The Acting-Governor of Angola in those days was the Bishop of Angola, whose sentiments on the subject of religion, as recorded by Livingstone, are broad-minded enough not to seem out of date for an advanced Review of 1913. This Bishop-Governor gave him an excellent riding-horse, which was of material use to him on his return expedition to the Zambezi, besides helping him in every possible way not only to return to the Zambezi, but to cross Africa to the Portuguese dominions on the other side. The Portuguese residents in London subscribed to a fund for fitting out Livingstone anew for crossing the continent to the mouth of the Zambezi.

Livingstone, or more likely his brother Charles, wrote harshly of the Portuguese on the Lower Zambezi, and the want of good-will that they showed to his expedition of 1858-64. Yet in the account given of that six years of martyrdom one is struck over and over again with

the forbearance, the unwearied kindness and hospitality, and often the acts of material help afforded by the Portuguese officials. The fact is that both parties were in a false position. The despatch by the British Government of the second Zambezi expedition was an act characteristic at times of our foreign and colonial policy—an attempt to shirk responsibility, to get some one else to pull the chestnuts out of the fire, and to avoid recourse to diplomacy.[1] Judged by modern lights, the Portuguese claim to lock up the Zambezi and the access to Lake Nyasa was unjustifiable, just as we cannot any longer defend in theory the attempt made by the British some years ago to constitute the commerce of Nigeria as the monopoly of a British company, or many other temporary or long-standing practices in our colonial policy. But the claim of the Portuguese was an historic and an uncontested one of 350 years' standing, when Livingstone started as a British Consul on a very indefinite mission to open up Zambezi to British commerce, settlement, and missionary work. The British Government should not have sent him on this enterprise without first of all coming to terms with Portugal: and in all probability the Portuguese might have been just as susceptible to reason as they proved to be when the matter was seriously tackled eighteen years after Livingstone's death. As it was, Livingstone and the members of his staff were allowed to do pretty much as they pleased in the Zambezi delta, on the Zambezi itself, and on the Shiré, but it was made quite clear to them that if their efforts resulted in success all British commerce in those regions must pass through a Portuguese customs house.

[1] Livingstone was also to blame for having leapt too hastily to a wrong conclusion about the navigability of the Zambezi in 1856, and thus having led the British Government completely astray. He followed the course of the Zambezi from the Victoria Falls to Tete mainly by land, and, of course, whole sections of the river escaped his observation. He thus emerged on the coast of the Indian Ocean at Quilimane with the conviction that, presuming the Zambezi river could be entered by shipping through one of the mouths of its delta—a possibility not concealed from him by the Portuguese—British ships or launches could steam up it to the Makololo country, in the heart of South-Central Africa. He exaggerated in his optimism the amount of sugar-cane and cotton grown in Central Zambezi at that time; and so, in short, the whole of the second Zambezi expedition was intended not to poach in Portuguese preserves, but to reach the heart of South Africa by the Zambezi channel, and there to carry on a profitable trade with a very enterprising and powerful negro people.

In the year 1860, however, Livingstone and Kirk made the journey from Tete to Sesheke and back mainly by water, and realised the impossibility of continuous navigation of the Zambezi channel between the Quebra Bazo rapids and the Victoria Falls. There are several impassable barriers in between, such as the Morumbua or Quebra Bazo, the Kakalole, and still more the Kariba gorge.

Here came the first great disappointment. Livingstone next chose to regard Nyasaland as his goal. In course of time proof of the difficulties of the Shiré navigation disheartened the British Government from giving him further support. Lastly, the Ruvuma route proved impracticable, and when this was made clear, the expedition was recalled. That the "six years of martyrdom" were not wasted we now thankfully realise in the existence of the prosperous colony of Nyasaland, and the steady progress of Northern Rhodesia. And it is a happy thing for an important alliance to be able to relate that Portuguese rule and commerce on the eastern Zambezi are better established now than they were in Livingstone's day. In fact, his ideals and his aspirations—even in regard to the Portuguese—have been fulfilled to the letter.

However that may be, the breakdown of this second Zambezi expedition was not really due to unwillingness on the part of the Portuguese to negotiate, but to the gigantic and unforeseen difficulties of the task on which Livingstone had embarked. The Chinde mouth of the Zambezi delta either did not exist in those days as a navigable passage, or was unknown or unrevealed. The Kongone mouth, practically discovered by Livingstone's expedition, was one with a dangerous and shallow bar: and although occasionally, by marvellous feats of seamanship, small steamers were got across it, the Kongone bar was one of the first causes of disappointment, loss, failure, and threatened disaster. In one instance, the disaster would have been almost complete but for the efforts and kindness of the Portuguese. Then the Zambezi and the Shiré proved full of difficulties for navigation. Above Tete were the almost impassable Quebra Bago rapids, while the navigation of the Central Zambezi between Quebra Bago and Victoria Falls was likewise beset with difficulties from the banks of the river on both sides being ranged over by truculent tribes and greedy chieftains.[1]

The Makololo power on the Upper Zambezi was rapidly decaying, yet owing to the great impression made on the chief and people by Livingstone's lieutenant, Sir John Kirk, the Makololo would have thrown their remaining energies into the support of a British settlement and administration of their country, and offered considerable grants of healthy, unoccupied land for that purpose: in fact, they wished to forestall the work which long since has been done by the British South Africa Company. The tract offered in 1860 by Sekeletu, the son of Sebituane, was in the country of the Batonga, north of the Zambezi. Here Livingstone had thought formerly that there were indications of a rather ancient negro civilisation, evidenced by the big, long-horned cattle of the Central Zambezi valley, and the dwarf cattle of the Batonga highlands, which were scarcely more than three feet in height. The Batonga also possessed a breed of small black and white goats and of small and very prolific fowls, sometimes known as "Makololo fowls." The hens of these pretty little bantams were said to lay an egg every day.

But Sekeletu's proposals remained a dead letter owing to the inaccessibility of his country. Advance up the Shiré to Lake Nyasa was temporarily stopped by the impassable Murchison Falls. The land route across the Shiré Highlands, across what is now one of the most peaceful, prosperous, and best governed parts of Africa, was arrested by the slave raids of the Muhammadan Yaos. But Lake Nyasa, in spite of all difficulties, was discovered by Livingstone, accompanied by Kirk, Charles Livingstone, and Edward Rae, on September 16, 1859.[2]

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[1] Even this overland journey up the Zambezi valley to the Makololo country could hardly have been undertaken in 1860 but for the active help of the Portuguese. Most of the Makololo men whom Livingstone had left behind from his first expedition at Tete had been demoralised by long residence there and refused to carry loads or even to march. The Portuguese lent the expedition porters and donkeys.

[2] It is only fair to say that Livingstone himself supplies us with information pointing to the obvious fact that he was not the first white man to stand on the shores of Lake Nyasa. A Portuguese magistrate or judge in native affairs at Tete, Senhor Candido de Costa

Twice did Livingstone, after this date, return to Lake Nyasa: in 1861 and in 1863. With a sailing-boat he and Kirk explored its shores (chiefly on the west) as far north as the Tumbuka or Northern Atonga country, and he himself marched through Western Angoniland and the Arab settlements of Kotakota. In 1863 he was obliged to reach the lake by marching overland, boats having been lost or destroyed and steamers proved to draw too much water for the depleted Shiré river. Once more he sought the hospitality of Kotakota, and from this Arab town he marched with desperate eagerness to the north-westward, hoping to accomplish something remarkable in geographical discovery which might enlarge our knowledge of Central Africa. But the knowledge that his expedition had been publicly cancelled, obliged him to stop within ten days' march of Lake Bangweulu and return painfully to England.

His last seven years of African exploration were somewhat meagrely assisted by a grant of £500 from the Royal Geographical Society and a grant of £500 from the Foreign Office. He was allowed to retain the title of Consul, but accorded no pay, and further warned that he must expect no pension. He might have been unable to continue his work at all—the work for which he was so clearly cut out—had it not been for the private generosity of Mr. James Young, the great chemist of Glasgow, William Webb of Newstead Abbey, and, perhaps one should add, Mr. John Murray the publisher. Livingstone—few of us seem to realise—had himself borne a considerable share of the expense of this six years' government expedition to Zambezia. He had spent £6000 of his own money on the *Lady Nyasa*, a steamer specially designed for him. Gathering together, therefore, such funds as he could set aside from the provision he had made for the education and maintenance of his four children, and combining with this the money subscribed by private friends and public bodies, he embarked in 1866 on his self-imposed mission of inquiry into the hydrography of Central Africa.

When resting at Linyanti on the Chobe river in 1855, he had heard from an intelligent Arab of Zanzibar, who had just reached that place overland from the east coast, of Lake Tanganyika and the great river Lualaba of Central Africa. He was at that time puzzled by the contradictory Portuguese and Arab stories of the Chambezi, which on account of the similarity of name was declared by armchair geographers to be the real Zambezi and the head stream of the Kafue. In 1864 he asked himself to what system belonged this mysterious Lake Shuia or Bemba (which he afterwards called Bangweulu)? To that of the Zambezi? If not, to what other? He realised in 1855 that the Kasai, which he had discovered in South Congoland, must be a very important affluent of

Cardoso, had made a journey about 1846 to the south-west gulf of Lake Nyasa, a very shallow inlet of water, and crossed this in canoes, probably to the Livingstone peninsula. Mr. Ralph Durand, in a series of articles on Livingstone, recently published in the African *Mail* (essays remarkable for their acumen and research) casts doubts on this achievement of Costa Cardoso; but the geographical details given to Livingstone in 1856 could scarcely have been quoted from one who had not made that journey. But it was clearly the shallow south-west bay of Nyasa which was visited.

the Congo, if not a main stream of that system. But he evidently did not conceive it possible till near the time of his death, that the Congo basin could extend so far as it does to the south-east and be fed by the Chambezi and the Lualaba. In his mind there could only be one alternative to the Zambezi as the recipient of these reported lakes and rivers of the Bemba country; and that was the Nile.

The animosity between Burton and Speke, the pardonable vanity as an explorer of Sir Samuel Baker, and other factors, had induced in the sixties of the last century very incorrect ideas about the ultimate sources of the Nile. The Victoria Nyanza had been split up into a number of separate lakelets or swamps, and the size and length of the Albert Nyanza exaggerated to an extraordinary degree. With regard to this last factor, we now know that Sir Samuel Baker's speculations were not so entirely unjustifiable. His gaze had penetrated south sufficiently far to have realised the general outlines of the Semliki valley. He was deceived by the blue slopes of Ruwenzori on the east and the lofty plateaus of Mboga and Bukonjo on the west of the Semliki, into imagining that the Albert lake[1] had an indefinite extension towards the south between vast mountain walls. In fact, if he could have seen a little farther or have heard stories of Lakes Edward and Kivu, he might have been still more positive on this score.[2] Then again, neither Burton nor Speke had properly examined the north end of Lake Tanganyika to ascertain whether water flowed out of it or into it. The rumoured Rusizi river might be an effluent, and Tanganyika be the farthest southern source of the Nile waters. Or Tanganyika might feed the Great River which since 1855 Livingstone knew to be dimly rumoured to emerge from a cluster of lakes and flow northward through the heart of Central Africa. Or it might be a locked basin independent of the Nile system: in which case the "Luapura" would prove to be the upper Albertine Nile.[3]

It was to the solution of this problem that Livingstone, without a thought for anything else, and yet regarding it as a mission divinely inspired, devoted all his remaining energies: but in the middle of this

[1] Lake Chowambe, as Livingstone calls it, following a name current amongst Zanzibar Arabs.

[2] In August 1870, Livingstone offered one of the Arabs about £270 in rupees and goods to leave the ivory trade "which is at present like gold digging," and convey him down the Lualaba "to see where it went, and back again to its western branching."

On February 25, 1871, he wrote, "I had to suspend my judgment so as to be prepared to find the Lualaba after all perhaps the Congo."

Livingstone heard, in 1871, of the Lomami and of other rivers of the Congo system farther west, and believed he might even get thus into touch with the French settlements and the Gaboon, and so prepared despatches to send home that way. He evidently felt by then that though the Lualaba might not be the Upper Congo, it could not be far from the Congo system.

[3] The geographical names, Luapula, Lualaba, Lufira, and Tanganyika were probably first inscribed on the map of Africa by Livingstone in 1856. "Zanganyika" is mentioned by Krapf as the name of a great trading-place in Central Africa, a short time before Burton and Speke discovered the lake in 1857. Livingstone derived his first knowledge of Tanganyika from the Arab, Ben Habib, whom he met at Linyanti in 1855; and he heard of the Luapula also from this Arab as well as from Portuguese reports. He derived much information about

task he was forced to realise the appalling devastation of Central Africa which was now resulting from the Arab slave raids. From about 1869 he had two objects ever before him: one was to solve the Nile problem, and the other to rouse the conscience of the world in regard to the Central African slave-trade.

Let us briefly consider his achievements as a geographical discoverer. He directly inspired the search for Lake Ngami, and was the main agent in carrying South African exploration beyond the arid plateaus of Bechuanaland and the Kalahari desert into what is really the Zambezi basin. Oswell and Murray contributed to the cost of his journeys, but he by his influence found the guides and secured the friendship or the neutrality of the native chiefs. He acted as interpreter-in-chief, and, thanks to the mastery he had acquired over the Sechuana language, was able to converse fully and freely with the natives of South-Central Africa. He also picked up a considerable knowledge of other dialects. He served diligently and skilfully as physician and surgeon all who were connected with these journeys. But his own predilections were for botany, zoology, and the study of man. It was the impression that native reports of his character had made on Sebituane, the Makololo conqueror of the Upper Zambezi, and the resultant protection afforded which made it so easy for Livingstone and Oswell to reach the Chobe river and the Upper Zambezi in 1851.

Between 1852 and 1856, Livingstone traced the main course of the Zambezi from its confluence with the Chobe northwards to near the sources of the Liba, and from this point westwards he was the first scientific geographer to lay down correctly the position of the upper Kasai and Kwango affluents of the Congo.

Livingstone may be quoted as the discoverer of the great Kasai (perhaps the principal among the Congo affluents for volume and for the extent of drainage area). At first it would seem probable that the Pombeiros, at the beginning of the nineteenth century, must have crossed the Kasai in order to reach the court of the Mwata Yanvo. But they appear to have deflected their route southwards, after leaving the upper Kwango, so that they passed round the sources of the Kasai, leaving them to the north. Ladislaus Magyar, the Hungarian explorer and trader (who married a negress of Bihé and travelled over Angola between 1849 and 1864), penetrated about 1851 to the upper Kwango

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the geography of southern Angola and South-Central Africa from *viva voce* information and the quoted records of the Portuguese; thus from them in 1855-6 he drew pretty accurately the course of the Kunene river and recorded the existence of the great Kubango three years before Andersson discovered it.

The names Lualaba ("Guarava") and Luapula ("Guapula") are first mentioned in history by Dr. Lacerda in 1798. He derived his information from the Pereiras, the Goanese slave- and ivory-traders whose explorations north of Tete caused them to be chosen as guides for the great Portuguese expedition of 1798-9. "Lualaba" and "Luapura" appear in the records of travel of the negro Pombeiros, who crossed Africa from Angola to Tete in 1806-11. The Pombeiros do not appear actually to have crossed the Lualaba, but to have skirted it near its source and passed to the south of it. Under the name of "Lualap" the upper Congo near Nyangwe is mentioned in the story of a Kanyoka slave woman told to the missionary-philologist Koelle at Sierra Leone about 1849.

and the north-west limits of the Zambezi basin, and may have seen the infant Kasai in 1855, a few months before or after Livingstone passed by. But he did not communicate the information to the world until after Livingstone's journey, and never, I think, specifically mentioned the Kasai, at any rate, before the publication of Livingstone's book. Moreover, he was no trained geographer or taker of observations for fixing points of latitude and longitude. Silva Porto, a Portuguese trader of Bihé, reached the upper Zambezi and South Congoland in the fifties and sixties, but his wanderings resulted in no addition to the map of Africa.

It is, indeed, remarkable what Livingstone's predecessors missed rather than what they found. Dr. Lacerda reached to little Lake Mofwe, an isolated lagoon about twenty miles south of Mweru and a short distance east of the Luapula. Yet apparently neither he nor any member of his expedition, before or after his death, had the curiosity to penetrate northwards one day's journey and discover Lake Mweru, or visit the banks of the Luapula. Going through the Bisa country they heard of a lake—"Lake Chuia," or Shuia, a short distance to the westward, and knew that the Chambezi flowed into it. This was Livingstone's Bangweulu [1] (named, as he tells us, from one of its islands). But the Portuguese of Lacerda's mission, like those of the Monteire-Gamitto expedition of 1831-2, made no effort to locate Bangweulu and place it definitely on the map. Lake Nyasa was heard of (as "Nyanja") by the Portuguese of the eighteenth century and early nineteenth: but it was not till 1846 that its waters—so far as historical records go—were actually seen by a Portuguese (Candido de Costa Cardoso). Gasparo de Bocarro passed near to Lake Nyasa in 1616 on his way to Kilwa and Mombasa, but seems to have crossed Lake Malombe or the upper Shiré only, and not actually to have seen Lake Nyasa.

Returning from Angola to the Chobe river, he discovered the Victoria Falls, and followed the Zambezi more or less closely down to its delta emerging on the sea-coast at Quilimane.

On his second Zambezi expedition he revealed to the world Lake Nyasa, Lake Chilwa (mis-written Shirwa), the high mountains of the Shiré region, and the course of the Shiré river, the Luangwa river to the west of Lake Nyasa, most of the northern confluents of the Zambezi in their lower courses, and the Butonga highlands. This second expedition was also the means of effecting a great increase in our knowledge of the Zambezi delta.

On his third great African journey he renewed previous explorations in the direction of the Ruvuma, and traced a good deal of the course of that East African river. He was practically the first European to explore West Nyasaland and the northern Bemba or Awemba country; he discovered the south end of Tanganyika, and made a shrewd guess

[1] Probably we do not yet know the correct native name for the open water of Bangweulu. It seems sometimes to be known as the Nyanja ya Lubemba or Luemba; whence "Bemba." Bangweulu, which Livingstone spells Bangweolo, in his propensity to turn all u's into o's after the fashion of the Bechuana peoples, is, or was, the name of one of its islands. The root *-emba* in "Bemba," "Awemba," "Liemba," "Luemba" seems to mean "lake."

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at its outlet through the Rukuga (which river he styled the Longumba).[1] He first revealed the great Mweru swamp or Chisera. "Elephants, buffaloes, and zebras grazed in large numbers on the long sloping banks of a river or marsh called Chisera." (This considerable extent of alternate swamps or shallow water was afterwards re-discovered by Sir Alfred Sharpe.) Livingstone made known to us Lakes Mweru and Bangweulu and the connecting Luapula river, and the course of the great Lualaba or upper Congo at Nyangwe. He also recorded the existence of the upper Lualaba or Kamolondo.[2] He was the first European to penetrate as far north as S. lat. 3° 30′ near the Elila river, and to describe the Manyuema[3] forests with the large chimpanzis and pygmy elephants found in them. He mentions for the first time the Lomami river, and is the first explorer to hear of the country of Katanga, its mineral wealth and its—as yet—unexplored, inhabited caverns of vast size. "A month to the westward of Kazembe's country lies Katanga, where the people smelt copper ore (malachite) into large ingots shaped like the capital letter I, weighing from fifty to a hundred pounds. The natives draw the copper into wire for armlets and leglets. Gold is also found at Katanga." Livingstone was the first writer to mention the possible existence of Lake Kivu: of Kavirondo gulf (Victoria Nyanza); and of Lake Naivasha: from Arab information, of course.

He was the first to record the existence of drilled stones in the country to the south-west of Tanganyika, which seemed to be evidence of the existence of a people of ancient bushmen culture in that direction,[4] and his remarks generally on the Stone Age in Africa, on the possible existence of undiscovered ancient types of mammals and of mammalian fossils, all show an enlightenment in speculative scientific

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[1] "It may be that the Loñgumba is the outlet of Tanganyika."—*Last Journals*, November 29, 1871. He states that in its lower course the Loñgumba is known as the Luamo. This is correct. "Lukuga" or "Rukuga," the name recorded by Joseph Thomson, is only a term applied to the sluggish, swampy leakage from Tanganyika which connected that lake with the Luamo affluent of the Congo.

[2] He wished to name the Luvua-Luapula (Eastern Lualaba) after his great friend William Webb, and the Western or Kamolondo-Lualaba after James Young, the Lufira (an important affluent of the Kamolondo-Lualaba) after Sir Bartle Frere; and to give the name of Abraham Lincoln to a supposed lake which he believed to lie in the course of the western Lualaba. It was while being detained for a long time in the Ulungu country, in August 1867, that Livingstone first heard of the main Lualaba or Upper Congo river, "about fifteen days west of Tanganyika, said to be 10 miles broad and known as the Logarawa, flowing northwards." "Kamolondo" is an unrecognisable native name only retained for convenience of distinction; the better term would be Lualaba, as contrasted with Lufira and Luapula: and "Upper Congo" should be applied to the mighty river which is formed by the junction of all three.

[3] The Manyuema is the southernmost portion of that vast equatorial forest belt which lies to the *north* and *east* of the main Congo, and extends with scarcely any interruption from south Kamerun to Ruwenzori and round to north-west Tanganyika and the Manyuema country. This region has a remarkable mammalian fauna, including the okapi, the gorilla, chimpanzi, great forest pig, bongo tragelaph, etc.

[4] On August 1, 1867, Livingstone describes a perforated stone which had been picked up and placed on one of the poles of an Arab stockade. It was oblong and showed evidence of the boring process in rings, the diameter of the hole in the middle being an inch and a half. The stone was of hard porphyry "and resembled somewhat the weight of a digging-stick which I saw in 1841 in the hands of a Bushman."

imagination greatly in advance of his times. He was also in all probability the first writer since the Portuguese chroniclers of the sixteenth century to allude to the remarkable ruins of stone-built forts, villages, and cities in South-east Africa. He derived his information from natives, and perhaps also from Boer hunters. He also mentions the coins found in excavating the shore of Zanzibar island, with Kufic inscriptions, and perhaps dating back to the ninth or tenth century A.D. (Sir John Kirk confirms this statement, and adds that some of these coins were of Harun-ar-rashid's reign, and bore the name of his viziers, Yahya or Fadl).

His biblical studies drew him into Egyptology, and one of his incentives to the exploration of the Nile sources was the conviction that Moses when living in Egypt had taken a great interest in Nile exploration. Livingstone half hoped that in discovering the ultimate sources of the Nile he might come across archæological traces of Egyptian influence. He was not pursuing in this direction an absolute chimera.

The physical appearance of so many of the Bantu tribes between Lunda on the south-west and Manyuema, Bambare, and Buguha on the north-east, constantly suggested to Livingstone's mind the idea of an immigration of Egyptians into Central Africa. Had he lived to penetrate to the countries north of Tanganyika to see the Hima or Tusi aristocracy on the highlands of Equatorial Africa, he would have been still more convinced of the ancient inflow of Egyptian influence into these regions, though it is a theory which it is very unsafe to pursue on the scanty evidence we possess at the present time.

When travelling from Tanganyika to Mweru in 1869, he remarks on the appearance of the chief and people of Itawa.[1] "Nsama, the chief, was an old man with a head and face like those sculptured on the Assyrian monuments. . . . His people were particularly handsome, many of the Itawa men with as beautiful heads as one could find in an assembly of Europeans. Their bodies were well shaped, with small hands and feet —none of the West Coast ugliness—no prognathous jaws or lark heels."

There is another entry in his journal derived from Arab information which bears on this theory of the Hamitic permeation of Negro Africa.

"The royal house of Merere of the Basango" (north-east Nyasaland) "is said to have been founded by a light-coloured" (Hamitic?) "adventurer, who arrived in the country with six companions of the same race. Their descendants for a long time had straight noses, pale skins, and long hair."

His journeys into southern Congoland threw a very interesting light on a native kingdom made famous by the earlier Portuguese exploration—that of the Kazembe of Lunda, whose capital was between Lakes Mweru and Bangweulu.

In the early seventeenth century a great negro empire had arisen in

[1] The Itawa country, he remarks, between Tanganyika and Mweru had many traces of plutonic activity. Earthquakes were by no means rare, and there were hot springs, some of which were used to boil the natives' food.

southern Congoland, partly due, no doubt, to the arms and trade goods derived from the Portuguese, but partly also to the after-effects of the Sudanese civilisation of Central Congoland under the Bushongo dynasty. This Empire of Lunda ruled over all the south of Congoland and a small part of northern Zambezia.

In the early eighteenth century a member of the family of the Lunda emperor, or "Mwata Yanvo," moved to the south of Lake Mweru and founded a feudatory kingdom there. He received the title of Kazembe, or "lieutenant."

Kazembe's capital was by the side of a little lake called Mofwe. Livingstone approached it along a path as broad as a carriage road one mile long, the chief's residence being enclosed by a wall of reeds 8 or 9 feet high and 300 yards square. The innermost gateway was decorated by about sixty human skulls, and had a cannon, dressed in gaudy colours, placed under a shed before it. This, no doubt, was a gift from the Portuguese. Kazembe himself had a heavy, uninteresting countenance, without beard or whiskers, somewhat of the Chinese type, his eyes with an outward squint. He smiled but once during the day, yet that was pleasant enough, though the cropped ears of his courtiers and the human skulls at the gate made Livingstone indisposed to look on him with favour. Kazembe was usually attended by his executioner, who wore a broad Lunda sword under his arm, and a scissor-like instrument at his neck for cropping ears. This was the punishment inflicted on all who incurred the Kazembe's displeasure.

Kazembe sat before his hut on a square seat placed on lion and leopard skins. "He was clothed in white Manchester print and a red baize petticoat so as to look like a crinoline put on wrong side foremost. His arms, legs, and head were covered with ornaments, and a cap made of various coloured beads in neat patterns. A crown of yellow feathers surmounted his cap. His head men came forward, shaded by a huge ill-made umbrella and followed by dependants . . ." This Central African monarch (whose descendant was finally deposed for cruelties by the British Government) bore an evil reputation: yet he was a good friend to Livingstone and put no obstacle in his path; though he politely told him that lakes and rivers only consisted of water, and that to ascertain this fact by ocular inspection would not repay him for his fatigues and outlay in trade goods!

Livingstone from boyhood had taken a great interest in botany and in the appearance of trees and flowers in the landscape. His observant glance led him to note all the more salient features of the African flora from the Cape to the equatorial forests of Manyuema. His books are full of little word-pictures of the strange, stately or beautiful trees and plants he encounters. He records in his journal the spectacle of the Crinum "lilies" of the Luangwa valley, which in the first rains "flower so profusely that they almost mask the rich, dark, red colour of the loamy soil, and form a covering of pure white where the land has been cleared by the hoe." The weird stone- or pebble-like Mesembryanthemums of the Kalahari Desert, and the gouty, leafless geraniums and vividly coloured pumpkins and gourds of the same region arrest his

attention: the Bauhinia bushes with their golden or bluish tinted, bifid leaves, and the scale insects on them exuding a sweet manna; the noble giraffe-acacia trees, the euphorbias of very diverse modes of growth, the *Strophanthus* creepers whose seeds possess medicinal or violently poisonous qualities, the borassus and hyphæne fan-palms, the wild date, and the "noble raphias," the pandanus and draciænas of the Zambezi delta or of inner Congoland, the innumerable forest trees of northern Zambezia and southern Congoland: all are illustrated in his pages by well-chosen words and sometimes explanatory drawings: and most are correctly named, in contrast with the very unscientific nomenclature of the generality of travellers in his day.

Livingstone notices as he descends the slopes of the mountains towards the Chambezi the abundance of the fig-tree which yields the bark-cloth, so that the natives cared little for the cotton cloths of Europe and India. He also in this region observed green mushrooms, which, on being peeled, revealed a pink fleshy inside (the *Visimbu* of the natives). Only one or two of these mushrooms were put into a wooden mortar to flavour other and much larger kinds, the whole being pounded up into a savoury mess, which was then cooked and eaten. But in Livingstone's experience this mushroom diet "only produced dreams of the by-gone days, so that the saliva ran from the mouth in these dreams and wetted the pillow." The country on the Chambezi slope of these Muchinga mountains was devoid of game, the game having been killed out by far-reaching and long-continued drives through the hopo fences into pitfalls.

He reached the Chambezi first on January 28, 1867. It was flooded with clear water as it wended its way westwards. Crossing that river and passing northwards through almost trackless, dripping forests and across oozing bogs, through a region which furnishes the most important and the ultimate sources of the Congo (he notices the pretty grasses in the oozes, with pink seed-stalks and yellow seeds), he reached the village of the great Awemba chieftain, Chitapangwa. He gave Livingstone a tusk and a cow. At this village he found a small party of black Arab slave-traders from the Zanzibar coast, and to one of these men, who was returning to Zanzibar, Livingstone entrusted a packet of despatches, which actually did reach Zanzibar and England.

Chitapangwa gave him a great deal of trouble haggling for a large present and wishing to have one or more of Livingstone's invaluable boxes, threatening if a suitable present was not given to bar the way to further exploration. With tact and good-humour, however, on the doctor's part, friendly relations were maintained. The chief's heart was especially won by a piece of red serge, which was a vestige of a handsome present of serge of this taking colour given to Livingstone by the Baroness Burdett-Coutts (as she afterwards became) before he started on his second Zambezi expedition in 1858. At intervals through his nine years' subsequent experiences, this serge had stood him in good stead.

Arrived at the coast of Tanganyika, early in 1869, after his discovery of Mweru, Bangweulu, and the Luapula, he was put into a

canoe by the Arabs, and made his way northwards along the coast till he reached certain islands, on one of which a young Maskat Arab received the party and fed them sumptuously. There were seventeen islands in this Kasanga group, and on the principal one was a breed of very large fowls, which Livingstone compares to the Cochin China variety. There were also numbers of Muscovy ducks.

He notes the decidedly brackish taste of Tanganyika water near the shore, but out in the middle the lake-water was quite sweet.

At last a favourable opportunity as regards the weather offered for the bold passage across the width of the Lake, a passage extremely dangerous to canoes when the wind raises the waves. And he reached Ujiji on the north-east coast of Tanganyika in March 1869, shattered in health and craving for letters and stores. It was to this place that he had directed his supplies and mails to be sent by caravans bound inland from Zanzibar, but little care seems to have been taken by the Arabs entrusted with the conveyance of these goods, and to Livingstone's intense disappointment he found that many of his stores had been robbed from him, whilst others had been left behind in Unyamwezi. Sixty-two out of eighty pieces of cloth had been stolen, and most of his best beads. His new supply of medicine, wine, and cheese had been left in Unyamwezi. The buffaloes which he had wished to import from India, in the hope that they might serve for transport, were all dead. Fortunately, there had come through a little flannel and a supply of tea. The flannel was particularly grateful.

He recrossed Tanganyika to resume his search for the Lualaba in July 1869. In his journal he recorded the abundance of pandanus screw pines off the west coast of that lake. As he travelled through the Guha and Manyuema countries he entered "the land of grey parrots with red tails" ["to play with grey parrots was the great amusement of the Manyuema people"]. The Manyuema country he describes as "surprisingly beautiful, palms crowning the highest heights of the mountains, and climbers of cable size in great numbers hanging among the gigantic trees." Strange birds and monkeys were everywhere to be seen. The women went innocently naked: and the Adams of this Eden wore nothing but a small piece of bark cloth. Both sexes atoned for their absence of clothing by having their bodies tattooed with full moons, stars, crocodiles, "and devices recalling Egyptian hieroglyphics." Yet although their country—prior to the Arab raids—seemed an earthly paradise smallpox came every three or four years to Manyuemaland and killed many of the people.

It was in the Manyuema country that he came into contact with the large chimpanzi (*Troglodytes schweinfurthi*) of eastern Equatorial Africa, whose range extends from the Welle-Mubangi river and Unyoro to the eastern bend of the Upper Congo and the west coast of Tanganyika.

The Soko, as he called this large chimpanzi, always tried to bite off the ends of the fingers and toes of the men with whom it fought, not otherwise doing them any harm. It made nests, which Livingstone described as poor contrivances with no architectural skill.

The Manyuema told him, however, that the flesh of the Soko was

delicious: and Livingstone thinks that through devouring this ape they may have been led into cannibalism. The Sokos gave tongue like fox-hounds: this was their nearest approach to speech. They also laughed when in play, and in their relations with the natives were quite as often playful as ill-tempered. The lion, which seemingly existed in the Manyuema country in spite of the forest, was said to attack and kill the Soko, but never to eat him. The Sokos lived in monogamous communities of about ten. Intruders from other camps were beaten off with fists and loud yells. If one tried to seize the female of another, the remainder of the party united to box and bite him. The male often carried his child, relieving the mother occasionally of her burden.

Rhinoceroses were shot in the Manyuema country. He also alludes to the pygmy elephant of Congoland, "a small variety, only 5 feet 8 inches high at the withers, yet with tusks 6 feet 8 inches in length"; and notes the killing of an elephant with three tusks, one of them growing out through the base of the trunk.

[The pygmy elephant (*Elephas africanus pumilus*) of the equatorial Kamerun-Congo forests was only rediscovered in the early part of the twentieth century.]

Livingstone reached Ujiji for the second time at the end of October 1871. "I was now reduced to a skeleton . . . But I hoped that food and rest would soon restore me." He found that an Arab at that place had recently sequestrated and sold all his goods, not leaving even a single yard of calico or a string of beads out of an enormous quantity. "I now felt miserable, having to wait in beggary, which was what I never contemplated. . . . I felt in my destitution as if I were the man who went down to Jerusalem from Jericho and fell among thieves." Yet the Arabs were not all bad, for one of them came to him and said, "This is the first time we have been together. I have no goods but I have ivory. Let me, I pray you, sell some ivory and give the goods to you. . . . . But when my spirits were at their lowest ebb, the good Samaritan was close at hand, for one morning Susi came running at the top of his speed and gasped out, 'An Englishman, I see him,' and off he darted to meet him. The marine flag at the head of the caravan told of the nationality of the stranger. . . It was Henry Moreland Stanley, the travelling correspondent of the *New York Herald*, sent by James Gordon Bennett . . . at the expense of more than £10,000 to obtain accurate information of Dr. Livingstone, if living, and if dead, to bring home his bones." Livingstone also learned that the British Government had not forgotten him, but had voted £1000 for supplies (so, at least, he writes in his journal, but this is probably an exaggeration).

He then went off at the request of the Royal Geographical Society to explore the north end of Tanganyika and lay down its geography definitely. This was done in company with Stanley. It was now shown by actual observation that the Lake had no outlet on the north, but that the Lusizi flowed into Tanganyika as the overflow of the waters of a rumoured Lake Kivu, not actually discovered till some twenty years afterwards.

Stanley was often ill in January and February 1872, and had to be

nursed by Livingstone. But in between his attacks of fever, Stanley recovered and shot a great deal of big game for the sustenance of the expedition. On December 27, 1871, Livingstone and Stanley had marched away together for Unyamwezi. Livingstone intended to pick up fresh supplies of trade goods and other porters. They reached Unyamwezi on February 18, and here Livingstone found letters awaiting him from friends and relations, pressing him with bland assurance to make a complete work of exploration of the sources of the Nile before he retired from the country. Livingstone, therefore, decided to return from Unyamwezi through Fipa to the south end of Tanganyika, then cross the Chambezi, pass south of Lake Bangweulu and due west to the "ancient fountains of the Nile and the underground excavations . . . of Katanga. This route will serve to certify that no other sources of the Nile can come from the south without being seen by me. No one will cut me out after this exploration has been accomplished, and may the good Lord of all help me to show myself one of his stout-hearted servants, an honour to my children and perhaps to my country."

Livingstone was almost an expert in geology and petrology. He felt the keenest interest in the records of the rocks, and fully realised the importance of palæo-botany. When descending the valley of the Central Zambezi in 1856, he discovered fossil remains of *Araucarian* conifers now confined to South America and Australasia: and fully realised what his discovery meant in regard to ancient land connections between South Africa, India, and South America. He was much impressed with the probable coal-bearing strata of sandstone throughout the Ruvuma valley. A great many pieces or blocks of silicified wood appeared on the surface of the soil at the bottom of the slope up the plateaus. "This," he wrote, "in Africa is a sure indication of the presence of coal beneath." In the sands of some of the rivers pieces of coal were quite common. He originated the theory of the rift valley of Lake Nyasa. "It looks as though a sudden rent had been made so as to form the lake and tilt all these rocks nearly over" (namely, in the direction of Ruvuma). His observations would seem to show that the level of Lake Nyasa was once about 55 feet above its present high-water mark. It is possible that at this high level its overflow of waters first of all passed into the basin of Lake Chilwa, and then flowed northwards into the Ruvuma system.

Here follow a few word-pictures of Central African scenery selected from his journals. On January 9, 1867, he had ascended a hardened sandstone range (of what have since been called the Sharpe mountains[1]), with very beautiful valleys having the appearance of well-kept English parks: but they were in fact full of water to overflowing, immense sponges, covered with close, short, green turf. Then followed a march through mountains which he describes as being of delicately-tinted pink and white dolomite. In the ravines there were noble Raphia palms. He ascended this northern part of the dividing range between the Zambezi system and the Chambezi, till he reached a height of about 5380 feet

[1] See my maps of Central Africa in *George Grenfell and the Congo*.

above sea-level, the mountains further rising above that to nearly 7000 feet.

He thus describes the south end of Lake Tanganyika in the western part of Ulungu. "From altitude of nearly 6000 feet above sea-level one descends 2000 feet to the lake shores, and still the surface of the waters is upwards of 2500 feet above sea-level. The sides of its basin are very steep, sometimes the rocks run a sheer 2000 feet down to the water. Nowhere is there 3 miles of level land from the foot of the cliffs to the shore. Top, sides, and bottom of this tableland are covered with well-grown forest and rich grass, except where the bare rocks protrude. The scenery is extremely beautiful."

"The Aisi, a stream of 15 yards broad, and thigh-deep, came down alongside our precipitous path, forming cascades by leaping 300 feet at a time. The bright red of the schists among the green sward made the dullest of my attendants pause and remark with wonder. Antelopes, buffaloes, and elephants abound on the steep slopes, and hippopotami, crocodiles, and fish swarm in the water. One elephant got out of our way to a comparatively level spot, and then stood and roared at us. . . . The first village we came to on the banks of the lake had a grove of oil palms and other trees around it . . . not the dwarf species seen on Lake Nyasa, but one with fruit quite as large as those on the west coast. After being a fortnight at this lake (Tanganyika) it still appears one of surpassing loveliness. Its peacefulness is remarkable, though at times it is said to be lashed up by storms. It lies in a deep basin, whose sides are nearly perpendicular, but covered well with trees: the rocks which appear are bright-red argillaceous schist; the trees at present all green: down some of these rocks come beautiful cascades, and buffaloes, elephants, and antelopes wander and graze on the more level spots: while lions roar all night. The level place below is not 2 miles from the perpendicular heights. The village (Pambete), at which we first touched the lake, is surrounded by oil-palm trees—not the stunted ones of Lake Nyasa, but the real West Coast oil-palm tree, requiring two men to carry a bunch of the ripe fruit. In the morning and evening huge crocodiles may be observed quietly making their way to their feeding-grounds: hippopotami snort by night and at early morning."

This is how he describes the route and the way of travel with the Arabs from Tanganyika to Mweru through the Itawa country.

"The valleys along which we travelled at the base of a range of low granite mountains were beautiful with their green grass and their clumps of trees of a great variety of form, creating that park-like scenery so characteristic of tropical Africa. The long line of slaves and carriers brought up by their Arab employers added life to the scene. The great caravan went in three bodies and numbered four hundred and fifty persons in all, each body had a guide and a flag, and when that was planted all the company of this section stopped till it was lifted and a drum was beaten and a kudu's horn sounded. Each of the three parties was headed by about a dozen leaders, or *wenyi-para*, dressed with a fantastic head-gear of feathers and beads, red cloth on their bodies, and skins cut into strips and twisted. These took their places in line, the drum beat, the

horn sounded harshly, and all fell in to resume the march. The female slaves walked bravely along carrying loads on their heads, but the actual wives of the Arabs were usually covered with a fine white shawl and wore ornaments of gold and silver on their heads, and many pounds' weight of fine copper leglets above the ankles. As soon as the slaves and wives arrived at the camping-place they began to cook, showing in this art a great deal of expertness, and making savoury dishes for their masters out of wild fruits and quite unlikely materials."

On March 29, 1871, he reached the outlying villages of Nyangwe on the Upper Congo. The country even at that date was open and dotted with trees, chiefly a species of *Bauhinia* that resists the annual grass-burnings. There were many Manyuema villages, each with a host of pigs. The altitudes seemed to be about 2000 feet above sea-level. The upper Congo or main Lualaba was narrower here than higher up its course in the south, but still a mighty river, at least 3000 yards broad, always deep, and quite impossible to ford. The current was about two miles an hour flowing north. The pigs at this place must have an interesting history as regards their origin. They could not have been brought thither by the Arabs on account of Muhammadan prejudice. They could not have come from the north, because the domestic pig of the *Sus scrofa* type is absolutely unknown in the interior of Equatorial Africa. They must have reached the Lualaba through the Rua countries, which in turn received them from Lunda, and that empire from Angola, and the Portuguese. From the same direction, perhaps, had come the Brazilian musk-ducks which Livingstone found in such abundance on the islands off the west coast of Tanganyika. The pine-apple also was just penetrating these Congo forest countries from the Atlantic seaboard.

This great explorer started on his earliest African journeys with a sound constitution; but the first shock to his system was the crunching of his left arm by the lion at Mabotsa. He did not, however, suffer much from malarial fever till he reached the upper Zambezi in Barotseland in 1854. The journey thence through South-west Congoland during the rainy season brought on severe attacks of dysentery, and these—alternating with malarial fever and rheumatism—followed all through Angola, so that he was seldom well for a week until he regained the bracing climate of South Africa at Linyanti in 1855. His rest at this place restored him to comparative health, a cure made more complete by the sea voyage home.

The six years spent in the exploration of Zambezia, Nyasaland, and the Ruvuma were marked by severe attacks of blackwater fever (as we now know it to have been) and by exhausting dysentery. He never quite regained his old strength and resiliency after that: even though he spent two years—1864-6—in England and Scotland. Moreover, during this time he had no tonic from the consciousness of success, and no complete freedom from monetary anxieties on behalf of his children's and his own future. He was in semi-disgrace, still holding a vague commission as a consul without a consulate, a salary, or any prospects of a pension. He would indeed have been in desperate straits had it not been for the previous and continuing generosity of his publisher and the

faithfulness of his friends, William Webb and James Young. Such as these—not forgetting Oswell—would have combined to place him quite beyond the reach of monetary embarrassments had he not been too proud of his independence to accept such help. But, at any rate, they subscribed towards his last great expedition in search of the Nile sources.

When the early summer of 1866 found him once more on African soil free from all entanglements, free to search as he pleased and where he pleased for the mysterious lakes and rivers of innermost Central Africa, his sense of elation long prevailed to counterbalance disappointments from a badly-selected staff of India sepoys. Extracts like the following appeared in his journal as he approaches Lake Nyasa from the east:—

"The mere animal pleasure of travelling in a wild, unexplored country is very great. When on lands of a couple of thousand feet elevation, brisk exercise gives health, circulates the blood, and the mind works well; the eye is clear, the step is firm, and a day's exercise always makes the evening's repose thoroughly enjoyable."

In the region west of Lake Nyasa, however, a most serious loss occurred to him. Two of his Yao porters deserted. They had been very faithful to him all the way from Lake Nyasa, taking his part in every difficulty with the natives, and preventing many disputes by their knowledge of the languages. Yet these men "of uniform good conduct" were guilty not only of desertion but of the cruellest robbery. They took with them the load which contained his medicine box, merely because wrapped up with it were five large cloths and the clothing and beads of one of the coast porters. In addition, they took all Livingstone's dishes, a large box of gun-powder, all the flour which he had purchased to last him as far as the Chambezi river, the carpenter's tools, and two guns. "I felt as if I had now received sentence of death, like poor Bishop Mackenzie." All the other goods Livingstone had divided in case of loss or desertion, but he had never dreamed of losing the precious quinine and other remedies. "It is difficult to say from the heart 'Thy will be done,' but I shall try." He then goes on in his diary to put forward all the excuses that he could for these wicked Yao people, who had been, and were for long afterwards, the curse of Nyasaland, though now they are one of the mainstays of the administration, and their soldiers in British uniforms have gone far and wide over Africa to Ashanti and Somaliland.

From this time onward entries like the following are of frequent occurrence in his journal:—

"I am excessively weak—cannot walk without tottering, and have constant singing in the head, but the Highest will lead me further."

On the night of March 20, 1867, he was terribly bitten from head to foot by the driver ants which invaded his hut. "The more they are disturbed the more vicious are their bites. They become quite insolent." A few months before his death he was similarly attacked, and at last driven from shelter to shelter till he stood nearly naked and bleeding in the pouring rain.

On December 22, 1867, Livingstone (who wrote in his journal at that time "I am always ill when not working"), having left Kazembe's court in the terrible rains at the height of the rainy season, says of himself:—

"Every step I take jars in the chest, and in my very weak state I can scarcely keep up the march, though formerly I was always first, and had to keep in my pace. . . . I had a loud singing in the ears, and could scarcely hear the tick of the chronometers."

"After I had been a few days here (near Bangweulu), I had a fit of insensibility, which shows the power of fever without medicine. I found myself floundering outside my hut, and unable to get in. I tried to lift myself from my back by laying hold of two posts at the entrance, but when I got nearly upright I let them go, and fell back heavily on my head on a box. The boys had seen the wretched state I was in, and hung a blanket at the entrance of the hut, that no stranger might see my helplessness: some hours elapsed before I could recognise where I was."

During the winter or rainy season of 1868-9 Livingstone was very ill. He had been wet, times without number, and suffered from terrible pains in the chest and pneumonia. He was often semi-delirious and subject to delusions, such as that the bark of the trees was covered with figures and faces of men. He thought often of his children and friends, and his thoughts seemed almost to conjure them up before him. For the first time in his life he was being carried, and could not raise himself to a sitting position. The Arabs were very kind to him in his extreme weakness, but the vertical sun, blistering any part of the skin exposed to it, tired him sorely in the day marches. He also extracted twenty maggots from his emaciated body, due to a species of stinging fly, which inserts its eggs into the puncture. As the grubs grew they formed exceedingly painful pimples on his legs. In July 1870, his feet were almost consumed with irritable, eating ulcers, pulsating with pain and constantly discharging matter. These sores were obviously communicated by mosquitoes from the blood of the wretched slaves, who were tortured with them. Livingstone could fall asleep when he wished, at the shortest notice. A mat, and a shady tree under which to spread it, would at any time afford him a refreshing sleep. But in his last years of travel sleep was often made sad by the realistic dreams of happy English life from which he wakened, to find himself ill and consumed with anxiety that he might not live to complete his mission.

After 1869 he suffered much from the results of the decay and loss of his molar teeth, so that imperfect mastication of rough African food induced severe dyspepsia, and his bodily strength weakened under a condition of permanent mal-nutrition. Stanley, by relieving him when he did, gave him at least two more years of life, a certain measure of happiness, and the sweet consolation that he was not forgotten, and that the magnitude of his discoveries was appreciated. In this brief sunset glow of his life he turned his face once more towards Lake Bangweulu in order to trace the course of the Luapula to Mweru, and its junction with the Lualaba, half hoping that he might then travel down the broad

stream till he entered the Bahr-al-Ghazal or the Albert Nyanza; but, although he now possessed comforts he had long lacked, and faithful, comparatively disciplined men, his strength gave out under constant exposure to rain, and to soakings in crossing rivers and marshes. Severe hæmorrhage set in from the bowels, and he died of exhaustion at Chitambo's village in the swamps near the south shore of Bangweulu on May 1, 1873.

NOTE.—I desire to add these remarks to the foregoing text of my address. In my preface to that address (see *S.G.M.*, p. 252), I animadverted with some emphasis on the treatment accorded to Livingstone by the Government of his day, more especially between 1863 and 1873. I see no reason to modify these passages. But in adding, as I did on March 27, that "after his death not one single penny was found by public subscription" p. 254), I unwittingly erred. Some £3000 was publicly subscribed 'chiefly in Scotland', which went to the relief, mainly, of Livingstone's two sisters at Hamilton. A larger amount would certainly have been raised but that the Misses Livingstone arrested the public generosity. Also the British Government awarded a pension for life to each of Livingstone's two daughters. H. H. J.

THE SPECIFIC CHARACTERISTICS AND COMPLEX CHARACTER OF THE SUBJECT-MATTER OF HUMAN GEOGRAPHY.[1]

By Professor JEAN BRUNHES (translated by E. S. BATES).

IT has been said by Taine: "Give a glance at a map. Greece is a triangular-shaped peninsula. Based on Turkey-in-Europe, it breaks away southwards, plunges into the sea, narrows down into the Isthmus of Corinth, and then continues southwards, forming a second peninsula, the Peloponnesus, which resembles a mulberry leaf, united as it is with the mainland by means of a sort of slender stalk. Add thereto a hundred or so islands, and likewise that part of the coast of Asia which confronts it—a fringe of little districts tacked on to huge barbarian continents, and bordering a blue sea bestrewn with islands—such is the country which has nursed and fashioned so precocious, so keen-witted a race. It was peculiarly well adapted for such a purpose. . . . A people fashioned by a climate like this would develop more quickly and more harmoniously than another: man is neither overwhelmed nor enervated by excessive heat; nor does cold constrain him to be stiff and stubborn. He is not condemned to dreamy indolence, nor to ceaseless exertion: he is not hampered by the meditation of the mystic nor by the brutality of barbarism."[2]

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[1] An Inaugural Lecture delivered by M. Jean Brunhes, Professor of Human Geography at the Collége de France, Dec. 9, 1912; published in the *Annales de Géographie*, Jan. 1913. As the translation is not always word for word, it is as well to note that the variations occur with the author's approval.—E. S. B.

[2] *Philosophie de l'Art*, 4th ed., Paris, 1885, pp. 102, 104, 105. He pursues the thesis thus: "Compare a Neapolitan or a Provençal with a Breton, a Dutchman with a Hindoo; you will feel how gentleness and moderation on the part of Nature infuse vivacity and balance

It has also been said by Hegel, as if in reply: "I trust no one will come and talk to me of the climate of Greece, seeing that where once the Greeks dwelt, Turks are dwelling now: I hope that that will be ruled out of the discussion, and that we shall be left in peace."[1]

There the two opinions are face to face. Nevertheless, we need not treat the *Philosophie de l'Art* as summed up in that one geographical explanation, and we shall have occasion to return to it: but we are aware how Taine's determinist preconceptions led him into thinking of the laws of human knowledge as identical with those of Natural Science: "The philosophy of history faithfully reflects the philosophy of Natural history."[2]

To others, on the contrary, Man is wholly independent of his physical surroundings. Sometimes the secret of all progress among the various groups of human beings, economic, historical, and geographical, is detected in continuity of mentality, sometimes in race. Gobineau has asserted: "Even if the white group dwelt right amidst Polar ice or beneath the fiery rays of the Equator, thither would the world's intellectuality trend. There would be the focussing point of all ideas, all movements, all effort: and there would not be any natural obstacles equal to preventing the commodities and the products of the farthest distant countries from arriving there, across seas, rivers, and mountains."

Before we can claim, or rather, before we can substantiate what is the due of Human Geography, we must first free ourselves from the attractions of Taine's magnificent style and of his over-simplified, over-systematised, analysis, and likewise from the doctrines of specialists in "ethnic influence."

Our primary need is to confront and to controvert these extreme views concerning the modalities of human activities on the surface of the globe, in spite of the fact that these views bear the endorsement of such great names. You will recognise too that everything we shall attempt to define during this course of Human Geography is not so evident as our account of it may seem to suggest: and, further, that our business at present is to restate three problems with the help of a few plain facts:—(1) how Geography is affected by History: (2) how History

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into the soul so as to be able to assist a mind that is alert and adaptable along the paths of thinking and acting" (*ibid.* p. 105). And farther on: "There you have the physical environment which, from the earliest times, has tended to stimulate the mental faculties. This race may be compared with a swarm of bees which, born where the heavens are kind but the earth inhospitable, makes the most of those aerial routes whereof it can take advantage. They reap, they plunder, they swarm, for their defence they have their wits and their stings; they construct fairy-like dwelling-places, they manufacture delicious honey; ever hunting, ever busy, humming away amidst the stolid creatures who live hard by, and who know no better than to feed under a master and to rage blindly against one another" (*ibid.* p. 111).

[1] This quotation and that from Gobineau which occurs later are given and discussed by L. Gumplowicz, *Der Rassenkampf*, Innsbruck, 1883, p. 15 *et seq.* W. Bagehot has said: "You could not show that the natural obstacles opposing human life much differed between Sparta and Athens . . . and yet Spartans and Athenians differ essentially" (*Physics and Politics*, 4th ed., 1876, p. 84).

[2] *Essais de critique et d'histoire*, p. 26. 2nd ed., 1866.

is affected by Geography: (3) how far, and in what ways, human beings are geographical agents?

After having thus determined the specific characteristics of Human Geography, we shall have recourse to a practical experimental demonstration; that is, shall select some section of the terrestrial surface whereon it will be possible to distinguish very definitely what is essentially Human Geography (properly so called) from what is termed political, or historical, Geography. These considerations will enable us to add a third part, wherein we shall endeavour to give a threefold reason why Human Geography is so complex a subject of study: because each fact (1) contains and implies a social problem; (2) necessitates and implies a statistical problem: (3) conceals and implies a psychological problem.

Starting, therefore, with a sort of introductory meditation, and continuing with a monographic illustration, we shall lead to a series of deductions.

I. The Specific Characteristics of the Subject-Matter of Human Geography.

(1) *The Influence of History on Geography.*

As men go on making history on the earth, they also make geography; using the word history in the widest sense of the term, to include all history, agricultural and industrial, military and technical, economic and social, scientific and religious. Archæologists and epigraphists make it their business to reconstruct vanished civilisations with the help of those fragments of temples and stones which I should be inclined to term the geographical dust of history.

Dr. Capitan, in his course last year at the Collége de France dealing with the great civilisations of Mexico, based his lectures on all these more or less obliterated features, more particularly on that embankment-work which serves as a memorial of those who once lived there. He likewise examined and classified all the innumerable and tremendous earthworks and tumuli, from the conical mounds on to those modelled in the likeness of animals, which the famous "Mound-builders" have scattered all over the east and south of the territory which now belongs to the United States.

So too the paved roads and the Great Wall of China: the Roman roads of our Gaul; the Napoleonic roads of our Europe; the trans-continental routes of the United States: the network of English cables, are not only illustrations, allegories even, of history, but also, and far more emphatically, adequate expressions, local or world-wide, of so many different types of imperial rule.

History reveals both co-operation and government becoming more and more effective agents in human life, and it becomes the business of geography to illustrate this fact.

A town, especially an embryo town, has often been conditioned by a well, a spring, a market, etc., and has crystallised around cross-roads, or along the side of a highway; certain villages, indeed, are so clearly

the creation of the road that the Germans have invented the well-justified term of Gassendorf or Strassendorf. In proportion as the agglomeration of houses continues, do the means of inter-communication grow more complex. And though the house, whether in the form of blocks of workmen's dwellings or of the twenty-five story hotel, does typify the collective character of the immense modern town, yet it is the means of intercommunication which typifies this best. Without this latter characteristic the great modern agglomeration could not exist. It is in evidence on the surface, forming a perfect web in its complexity, not only with its suburban lines and stations, railways and waterways, but also by means of arteries and veins which condition and regulate its internal life. Just for a moment let us try to visualise Parisian means of inter-communication. What a mass of lines, high and low, crossing and recrossing, various in levels and infinite in direction! A girdle of railways, a network of street trains, horse 'buses and motor 'buses, the subterranean and aerial network of the Métropolitain and the Nord-Sud, telegraph and telephone wires, pneumatic tubes, conductors of electric power and light, water pipes, gas pipes, and sewers, etc., whithersoever we turn or walk, or go down or go up, we pass through a maze of tubes and wires which hem us in, overshadow us, undermine us, and all to put us in touch with other human beings. Did the whole tangle lie visible before us in its entirety, it would seem to us like a vast, unsymmetrical tissue of steel, iron, copper and lead, more complex and more deliberate than the most intricate of spiders' webs: and therein we should see the supreme expression—so far as matter can express it—of all the mutual understanding, the ties, the sense of solidarity that have as yet come into being amongst that swarm of individual and domestic entities which, when crushed together on to a single point of space, create that excrescence, that uncouth blot, that species of geographical tumour, that we term—a town.

Others have pointed out the increasing attention which modern historians tend to give to all these surface-features, houses and roads, tillage and breeding, quarries and mines, which are, so to speak, the projection of the will of Man on the superficies of the Earth's crust. And M. Camille Jullian, the historian of Gaul, who is continually becoming better qualified to claim the proud title of historian of the national soil, lectured last year on the "Topographical Formation of Towns." He was inquiring into the origins of cities, and he dealt not only with the fortifications and with the sanctuary, but also with the spring and with the market; and, basing his researches on historical documents and map in hand, he examined the influence of the towns on the routes, and of the routes or havens on the towns. So also with M. Georges Renard, the Professor of the History of Labour: when he came to outline the course of the evolution of agriculture during the last 150 years, he did not merely note the advance in methods of culture due to the advance in chemical and biological knowledge: he indicated the result, namely, "the stretches of land wrested from the sea, from the marsh, from the sand-banks, from the desert, and from

the bush," and further, "the migrations and variations of plants which Man finds useful or attractive."

All the great civilisations of Asia, the mother of our modern civilisations, have found their expression in magnificent and complex systems of irrigation, or else in innumerable flocks and herds, or else—and it was this last kind that proved the strongest—in oases of agriculture farmed in co-operation with brave men who derived huge profits from a pastoral life on immense grassy steppes.[1]

As in great things, so in small. Fortified churches, such as that of Royat in Auvergne, or that of Hunawihr in Upper Alsace, are, so to speak, documents which summarise a whole period of history. Round about Trier and throughout the schistose massif of the Rhine, the Prussian Government has replanted the districts which had been deforested by their former rulers or by the armies of the great revolutionary period: the country-folk call these trees *Prussaplanne*. Districts which once grew cereals would, under present economic conditions, be condemned to an ever increasing inferiority: but they have been successfully transformed into districts where pasture predominates: in the villages which are the natural centres for these districts, the former "halle au grain," or "grenette," is shut up or pulled down, at Saint-Flour, *e.g.*, or at Lausanne. Again, political powers who find themselves forced into developing navies, create harbours at any cost: Trieste and Fiume are towns which, but for the theory and practice of "free ports," could never have come into existence.

Some day we shall be studying, in some detail, the geographical effects of the Continental Blockade. We shall note the part played by the Hanseatic towns and by those, Gothenburg, Stralsund, Oldenburg, which constituted veritable cleavage-points in the blockade system. We shall inquire into the more or less lasting results of that daring endeavour, not only on the towns and on channels of commerce, but even on the general economy of our tillage: there is not one amongst us whose daily food is not still, by reason of the quality or quantity of sugar consumed, modified by the political plan devised in opposition to England by the extraordinary will-power and individuality of Napoleon.

Thus and thus is our daily life interwoven with a thousand trifling facts which symbolise one or other of the most decisive episodes of world-history. A Yankee passes a negro in the streets of New

[1] "At every period of history at which we find Mesopotamia under the control of a race who knew how to defend it against the nomads, and how to administer it and to manage the water wisely, abundant prosperity is manifest; the generous earth gives a hundred-fold return for the seed sown. When the Turk is the ruler, anarchy comes in his train, the canals become choked up, the Arabs of the desert make the laws, and the country falls into the state of insecurity, wretchedness, and unproductiveness, in which we see it to-day. A firm hand and a restoration of the irrigation on the lines proposed by the engineer Willcocks, would be sufficient to enable this country, which has seen Babylon, Nineveh, Ctesiphon, and Bagdad, to become once again one of the most fertile of the Earth. Thus profoundly does Man's action affect the geographical aspect of one and the same country; sometimes it is that of a conqueror, sometimes of a protector, sometimes of a destroyer." (René Pinon, "La Géographie Humaine," in the *Revue Hebdomadaire*, 1911, p. 180.

York: if he condescended to notice him, the line of thought would take him back to the black African chieftain to whom the contractors applied for the manual labour needed by the cotton and sugar planters: what an amount of history in that woolly hair, in those thick lips, in that country, in that latitude! The maize which the low-lying plains of the Save and of the Danube produce in such abundance: the potatoes which occupy so many an acre in Ireland, in France, and in Germany, convert vast tracts of land in this Old World of ours into permanent memorials of the discovery of America.

The plain truth is that the outstanding facts of Geography at the present time are not the discoveries of the North Pole and of the South Pole. For the bold and learned pioneers of Polar exploration we have the most enthusiastic admiration: we have just received the intrepid Roald Amundsen with the hearty welcome that is his due: and we, as Frenchmen, are proud to remind ourselves in this connection of the glorious name of Charcot. But whatever may be the most heroic facts in the history of the world, the most important are events such as the realisation of the Suez and Panama Canals. And if all the history of the world, political, economic, and social, has been, or is about to be, subjected to fundamental changes in consequence of human initiative taking directions like those to which I have just referred, it is precisely because human beings are transforming the surface of the globe itself, and so are factors in, indeed, incarnations of, Geography.

(2) *How History is affected by Geography.*

If facts which seem so tremendous from a human point of view and so trifling from the point of view of the Earth, bring about and set in motion, as they do, fundamental and widely differing changes in the lives of human beings and in their mutual relations, we may deduce from them to what extent humanity, individually and collectively, directly and indirectly, is affected by the distribution of land and sea, by the conformation of continents, by the nature of the channels of inter-communication (*e.g.*, sea or river)—in a word, by situation. I cannot to-day enter into detail to the extent needful to make that idea of situation come home to you afresh, and to tell you how far all of us, individuals, municipalities, states, races, civilisations, are functions of the point of space whereon we have been born, functions of the point of space wherein we live, functions of situation.

A master-historian, Gabriel Hanotaux, speaking of Sicily, summing up its history in that terse and vivid way of his which sums up life, wrote: "Palermo looks towards Europe, Agrigentum towards Africa, Syracuse towards Greece: thus does Trinacria fulfil her formula, her threefold orientation, and her threefold fate."[1]

Routes have contributed their large share to history according as they have more or less conditioned the relative values of situations. Routes undoubtedly have brought men together, in the fullest sense of

[1] *La Méditerranée: Le Pair Latin*. Paris, n.d., p. 175.

the phrase, for they have done work among groups of human beings analogous to that which would have been effected had stretches of land or water been obliterated, a reduction of stubborn distances. That is the idea—a true idea—which underlies the words: "Do we not know that the quest of routes—amber routes, tin routes, ivory-, silk-, and spice routes—lies at the bottom of the chief events that have happened to humanity? Consider what Suez, Bagdad, the Alpine tunnels, and Panama, have meant to history, and mean to-day."[1]

But what is it that creates a route? Several preliminary conditions must be satisfied: products must be in demand, products which can be transported: a sufficient number of people must demand those products; conditions must be favourable to inter-communication. One of the lines of communication which Nature has most unmistakably provided for mankind is that "transportation-belt" which runs from New York to Lake Erie, where the railway lines follow it, first along by the Hudson and afterwards westwards from Mohawk Pass. The districts either side of this line contain 30 per cent. of the land in the State suitable for tillage, 77 per cent. of the population, all the towns of more than 100,000 inhabitants—New York, Syracuse, Rochester, Buffalo,—and, with hardly an exception, all those of more than 50,000. That way, too, lies the means of communication by water between the sea and the lakes; and it possesses the double privilege of rich alluvial soils and a temperate winter climate. What else could happen than that such a district should sooner or later take precedence of those that border it?[2]

At a later date we shall have occasion to analyse the geographical intuitions of Montesquieu, Turgot, Daunou, and Heeren: but the first historian to feel and to assert, in any really striking way, that History is in some degree dependent on Geography was Michelet: "Without a geographical base, the people, the actors in the historical drama, seem to walk in the air, as they do in Chinese pictures from which the ground is omitted. And notice that the soil is not only their stage; it influences them in a hundred ways, through their food, the climate, etc."[3]

But difficulties arise immediately we attempt to define the share that the facts of Nature have in deciding human destinies. We shall endeavour to make clear how History had been little by little getting into touch with the earth previous to the appearance of P. Vidal de la Blache's "Tableau de la Géographie de la France,"[4] the most perfect example of scientific explanation that exists. And please allow me to tell you, to-day and here, how proud I am to say that I have been, and still am, the pupil of such a master: it is more than ideas that I owe him: I owe him inspiration, initiation, the sense of all the finer shades of the sub-aerial interplay between Earth and Man: in short, the passion for Geography.

[1] H. Hauser, in the *Revue Historique*, cviii. p. 170.

[2] Cf. "The Distribution of Population in the United States," by Albert Perry Brigham, in the *Geog. Journ.*, xxxii., 1908, p. 384.

[3] *Histoire de France*, preface of 1869, i. p. v.

[4] The introductory chapter in Lavisse's *Histoire de France*.

We must, then, make up our minds to put aside generalities, and vague analogies between nature and man. We must make it our business to search for facts of interaction.

Now if the facts of Nature react on the faculties and on the occupations of groups of human beings, it is because there exist intermediary facts, of fishing and hunting, of tillage, of diseases, etc.: and these throw light on points of contact between terrestrial and human activities, and suffice to reveal the influence of the former on the latter. We may truthfully say with Napoleon that the policy of States lies in their geography,[1] but that is not enough. In order to make it clear to you how desirable it is to orientate historico-geographical researches, I will quote some lines which illustrate with far greater completeness one of the material modes of political power: it was written in 1902, concerning Madagascar: "Every day proves the truth of the formula—he who is master of the cattle is master of the country. However refractory a tribe may be, it returns to its senses directly its cattle are seized."[2]

When you come from Paris and have reached the summit of the last of those circles of heights which form one of the essential features of the Parisian Basin, you see, silhouetted against the further horizon, the hill and town of Laon: a little plateau which, thanks to a stubborn stratum of twelve yards of coarse limestone, stands firm, both level and high, above the sandy strata around it. It looks like a sort of circumflex accent, cut short all round by sheer cliffs, and in former times the district which it dominates was unhealthy marshland, an excellent defence. All the history of Laon forces itself on the memory: how it was an outwork of Christianity in Northern Gaul, an islet fortress which the Vandals left alone, the refuge of the later Carolingians. Was not this exceptional conformation predestined to be the base of a stronghold, and that a most efficient one! Let us go further still. Is it not a matter of cause and effect that so clearly defined a township as this, at whose very gates there began a steep slope splendidly suitable for defensive purposes, should have been the first to summon up sufficient hardihood and sufficient consciousness of its own collective actuality to rebel against its episcopal overlord? Is not this an admirable example of history as influenced not only by situation, but also by the structure, by the conformation, of the ground?

And yet, and that even in this very example, while men are clearly predestined by the Earth, they are likewise predestined by what they themselves have created on their atom of space. Once a site has been chosen by its earliest inhabitants, their successors are subjected to two influences, Geography as Nature wrought it, and Geography as modified by man. To calculate the inter-relations of the two is no easy matter: but our inquiry drives home this moral, that men become the allies of their geographical surroundings not only by virtue of the inherent fitness of those surroundings, but also by virtue of facts of

[1] *Correspondance de Napoléon*, letter of Nov. 10, 1804, addressed to the King of Prussia (4to ed., x. p. 59, No. 8170).

[2] Cf. *Annales de Géographie*, xi., Chronique du 15 mai 1902, p. 285.

Human Geography which result from their deliberate choice and activities.[1]

So, too, with climate. Everybody later than Montesquieu has accepted the idea that the modes of human activity are conditioned by facts of climate. But what are the real conditions imposed? How does the climate influence us? It acts directly on our organism: it acts indirectly by means of other organisms whose growth it fosters, and which are the intermediaries for the propagation of this and that disease: it acts, further, through vegetation and the food which that vegetation supplies. And it is just as necessary here, as elsewhere, perhaps more necessary, to rejuvenate current assumptions by analysing them, for they are far too slipshod and superficial. In a given year certain relations exist between the sum and succession of the details of the weather, and the quality and quantity of the crops. But there is more than one kind of corn, and each kind requires different conditions as regards soil and climate, which latter will make almost another plant of it: certainly another plant so far as Human Geography is concerned. There was a time when Americans had never heard of hard wheat: Cherson wheat was only discovered about four or five years ago. This Cherson district is beyond the black earth limit: it is dry prairie: Cherson wheat has meant the gain of 100 miles from the Great Desert. To-day the United States are producing 60,000,000 bushels of this wheat annually.[2]

(3) *Men as Geographical Agents.*

We see the surface of the earth as partly rugged continent and partly level ocean, and we see, too, earth-waves as well as water-waves, the latter mobile, eternally vanishing and re-appearing, and the former, of stone, motionless: then there are sand-waves also, varying as water varies. Glaciers, likewise, and torrents, rivers, the phenomena of eruption—all these imply some marking or other of the Earth's surface; and more, they are incessantly at work changing and carving, and, within limits, remodelling it. But, side by side with, and amidst all these factors, whose activities, when scientifically analysed or explained, constitute the subject-matter of physical geography, co-exists yet another, the most potent of all those that are modifying the terrestrial surface—Humanity, the sixteen hundred millions who are always at work, and always increasing in numbers. What renders them the most potent agent is not superiority in strength, but universality of range: not a deadly certainty in method, but adaptability of method to surroundings; not a concentration of tremendous force on a given

[1] By this means we come to replace the unreal "heterogeneous determinism," such as Taine's, by a determinism which may be "homogeneous." I am borrowing these ingenious and accurate expressions from M. Paolo Arcari ("The classification of the content of literary work from the point of view of the comparative history of Literatures," in the *Germanisch-Romanische Monatsschrift*, 1910, p. 142).

[2] For this information I am indebted to Dr. Aaronsohn, the specialist who so recently discovered wild wheat.

point, but the endless multiplication and synthesis of a series of small achievements whose sum-total is capable of transforming the appearance of continents.

In short, there is a very large part of the surface of the globe which may be termed a "human surface." The simplest and clearest definition of Human Geography is the study of this "human," or, still better, "humanised" surface of our planet.

One of the most ardent students and admirers of this humanised surface is Mr. Albert Kahn: he believes that in the study of it lies one of the principal means, not only of the furtherance of co-operation among men of science, but also of the cause of Peace. His desire is that everybody should be enabled to go and see for themselves and appreciate what everybody else is doing, and, being wholly unsatisfied with fine phrases, and in the habit of combining the most idealistic of dreams with the practice of what is practicable, there has occurred to him, as you are aware, the ingenious idea of founding scholarships for world-travel, whereby young men may be enabled to gain a preliminary acquaintance with the inhabited world in the hope that they may thereby acquire the taste, in fact, a passion, for getting to know it better. One day Mr. Albert Kahn learnt that it was under consideration whether or no a place should be found for Human Geography at the College de France, and it occurred to him that he might give effect to what had so long been an earnest wish of his by endowing a new lectureship at this great school of scientific work. With that breadth of mind, therefore, which knows no yielding, and yet knows how to make the best of what is to hand, he has requested that, at this college and from this chair, instruction should be given which should utilise all the best means yet devised for recording facts, and should set before itself the aim of revealing human achievement in relation to the earth with complete scientific accuracy and, so far as possible, in all its inherent and absolute beauty. The founder of the world-travel scholarships has skilfully preserved his anonymity for years, and would not agree to be present here this evening, but he cannot prevent our thanks reaching him, the personal gratitude which I feel myself as well as that which I am commissioned to express as from the chief of the Collège de France, and from the college itself as a whole.

To-day, thanks to the advance in kindred branches of knowledge—geology, meteorology, botany, biology—physical geography is on a sound basis. And history, archaeology, prehistory, anthropology, ethnology, and the economic and statistical sciences, are in their turn becoming richer and richer, both in quantity and in quality, in genuine evidence, and are becoming masters in their own houses. They are all realising, and stating, that the isolated fact is susceptible of such contradictory interpretations that it is inadvisable to study it in isolation; it is necessary to restore it to its place in the current of the life which gave it birth. It is a link in a chain: and the welding of the chain is the work of that unknown quantity—Life.

Quite recently M. Emile Boutroux commented very truly: "A

famous philologian, M. Michel Bréal, in his celebrated *Essai sur la Sémantique*, has explained that we must avoid thinking of speech as of a thing that is of spontaneous growth in accordance with laws not made by Man. He considers that as regards the evolution of speech, all external conditions rank as no more than secondary and incidental causes; the only effective cause is human intelligence and volition."[1] Now Human Geography is in the same case, only still more so. All the phenomena of Life are dependent on their surroundings, but these latter are always in a state of evolution, and always will be. If we bear this idea in mind, and are intent on being something different from mere collectors of notes—are, in fact, among those who aim at bringing about what Michelet termed the wonderful "resurrection" in every department of research—then the sciences which depend on observation, whether economic, moral or social, are bound to become studies of surroundings, surroundings which Life is incessantly modifying and transforming.

For the purpose of throwing light generally on the sciences which are concerned with Life, more particularly with human life, recourse ought to be had to geographical researches which bear directly on human life. But such researches will have to begin with the most unequivocal observation: exactness in observation must needs be the primary and essential guarantee for the possibility of accuracy in the explanation that is to come.

One of the most genuine of contemporary geographers, Professor Woeikof, of St. Petersburg, very truly remarked that Man's power over the Earth is mainly dependent on his manipulation of its movables.[2] The remark can be insisted on to its furthest application. One of the chief aspects of human activity consists in controlling drops of water, *i.e.*, in determining the destination of raindrops, damming channels, constructing canals, directing water (whether running or stagnant), drop by drop, on to the surface of the fields for irrigation, or down below into drains to relieve excess of moisture. So too with immovables. Real cultivation always implies a more or less thorough reorganisation of the upper strata of the soil; constructing houses, roads, or mines, implies, to begin with, cutting through masses of earth and forests, and removing, we might almost say turning into movables, quantities of minerals and tree-trunks and branches which are fixed to the soil by their roots. On all sides we find men breaking up sections of the surface, sometimes amounting to hills and mountains; and dissecting, displacing, and stacking pebbles and blocks of stone. Wherever they are, they are giving stability to particles of sand and reducing rocks to dust, and, on the other hand, are at work on the dust, consolidating it all over again. Minerals, they melt down in order to make ingots. In short, the whole work of civilisation in relation to matter consists of subdividing, amalgamating, condensing.

[1] From his address delivered to the constitutive Assembly of the French Institute in the United States, June 14, 1911.

[2] A. Woeikof, "De l'influence de l'homme sur la terre" (*Annales de Géographie*, x., 1901, p. 98).

I have already made an effort, in a book of mine, to meet the elementary demands of observation by outlining a definite, though in nowise dogmatic, system of classification. I may be allowed to summarise the ideas underlying it.

It seems to me that all human activities on the terrestrial surface may be reduced to six essential kinds:

(1) Houses, and (2) Roads. These two are always co-existent, and combine to form not only villages and towns, but also, as we have already seen, the outward and visible expressions of more complex political entities, States and Empires. These two kinds of achievement form a first group which may be described as "facts of the unproductive occupation of the soil." Next come—

(3) Gardens and farm-land, and (4) Beasts of burden, flocks and herds, domestic animals, cultivated plants. These form the second group, — "facts of conquest, vegetable and animal." Lastly, men destroy, or carry off, without any intention of replacing, organic and inorganic products of both land and sea wherever their means of destruction enable them to do so. The third and last group, therefore, consists of—

(5) Devastation in relation to vegetable and animal products, and (6) Exploitation of minerals:—"facts of destructive economy."

Unproductive occupation of the soil, conquest of the vegetable and animal kingdoms, destructive economy: might we not state them more simply and with clearer antithesis as three forms of occupation, unproductive, productive, and destructive?[1] Destructive occupation is, as a rule, a sign that human beings are only just installing themselves on that point of the globe: productive occupation will follow if they are to win a livelihood there permanently: and unproductive occupation is the final development and obviously implies the most stable and the most characteristic stage of their activity. I have hitherto avoided making use of these expressions in my writings lest I might seem to have sought out formulae which were neater than they had any right to be, and which were verbal rather than real. Let us look at realities first, and that with eyes wide open: let us endeavour to analyse and to classify; the right phrases will come in due course.

And I myself will admit, with the greatest readiness, and with that frankness of criticism which ought to characterise every effort towards the reality of science, and which it is a man's first duty to apply to himself, that I am not very well satisfied with the designation of the two first essential "facts" in the above classification—houses and roads. The words "unproductive occupation of the soil" are accurate so far as the earth is concerned, seeing that, in both cases, it remains unproductive in consequence of men's action: but it is an ambiguous term as regards Man's efforts, inasmuch as, in relation to himself and to civilisation, they have a very real productive value. If you discover a better

[1] Some careful readers of my *Géographie Humaine* have already thought of these simpler formulae which I had omitted intentionally. Cf. the very interesting article by Ph. Gidel in *L'Enseignement secondaire*, July 1912, p. 211.

term I shall be the first to rejoice thereat; we will be fellow workers, without spending too much time on difficulties over words. If we were satisfied with ourselves, if we had abandoned that fruitful discontentedness which is the beginning of scientific wisdom, neither the one nor the other of us would be likely to be found here. I am bound to add, too, with the same frankness, that, as a matter of fact, this classification is the first of its kind.

It is put forth, therefore, without dogmatism, as a means to an end, as a convenient instrument to assist us in our purpose of unravelling the tangled skein of the web that human effort has woven on the surface of the earth. But what I do maintain, with all the zeal that conviction implies, is the principle which inspires this classification, and likewise the result it aims at. Readers of the second edition of my *Geographie Humaine* will at once concede that I have never tried to confine Human Geography to the single species of "visible and photographicable facts": but I have said, and I repeat, that facts of unproductive occupation of the soil, facts of conquest, vegetable and animal, and facts of destructive economy, are, on the one hand, the intermediaries and the symbols which consecrate to the service of humanity all the rest of the subject-matter of physical geography, while, on the other hand, they form points of departure, are outward and visible signs of every thing which is both within the pale of human activities and also truly geographical. All the moral and social sciences take the same complexes of human activity for their subject-matter: but ethnologists and statisticians do not work on the same lines as historians, nor historians on those of ethnologists or statisticians, however much each may assist the other. Then geographers likewise should commit no trespasses: they ought to have their own prescribed domain for inquiry and analysis. Human Geography lies, as it were, where roads meet, whither come many facts, and those from many quarters: but for all that it has no call to turn itself into a bazaar in which everything is retailed. It is, and it ought to remain, a highly specialised department, admittance whereto shall only be vouchsafed to such facts as have a right to be there.

In order to make my meaning quite clear, I have judged it best to have recourse to the method which I have employed before, *i.e.*, an exhaustive monograph. What I want most of all is this, that both you and I should possess the clearest of ideas as to what it is that we are working at together; and since there is no process that reveals truths so explicitly as that of taking facts and trying to draw inferences from them, I intend to use part of my time now, and also on future Mondays, to considerations respecting Bosnia-Herzegovina.

II. A Monographic Illustration: Bosnia-Herzegovina.

Well, then, I have been to Bosnia-Herzegovina. I set out before the declarations of war: I was intent on the study of matters scientific, which seemed to me particularly well suited to lend point to this new course of mine: but circumstances, over which neither you nor I had any

control, have imparted a remarkable degree of actuality to these wanderings of mine on Servian soil.

In Bosnia and in Herzegovina Turkish rule endured without mitigation from the fifteenth century right on to 1878, at which date a neighbouring Power was commissioned by the Congress of Berlin to administer these territories under the suzerainty of Turkey. This Power, Austria-Hungary, colonised — I use the word deliberately — this variant of Algeria and Tunis, and has subsequently reaped the benefit of prolonged and systematic effort in proclaiming the definitive annexation of the two provinces on October 5, 1908.

As soon as you forsake the Austrian half of the town of Brod and cross the broad Save by the great iron bridge, which serves both for railway and for all other traffic, you see outlined against the horizon the minaret of a mosque, the belfry of a Catholic church, and the belfry of an Orthodox church: it is the village of Bosna Brod, the Bosnian half of Brod. You are entering Bosnia. Bosnia and Herzegovina are the most northerly of European countries in which Mohammedanism is recognised as a State religion, and the mosque at Brod is nothing exceptional: it is but the first of the thousand mosques which confront the traveller who enters from the north, and which are scattered throughout the 50,000 square miles of the territory of Bosnia-Herzegovina. They are likewise the only countries wherein the three faiths are found co-existent to this extent: the Christian churches are fewer than the mosques, but this is the result of Bosnia-Herzegovina having escaped from four centuries of Turkish rule only as lately as the date of the Congress of Berlin: but it is a district where Christianity dates very far back, where ancient churches are still standing, besides the ruins of many others, as well as besides the brand new ones—generally very ugly, it must be confessed—which bear witness to the newly won freedom. In Croatia and in Dalmatia there are no Mohammedans: in Servia and in Montenegro hardly any who are not Orthodox (98 and 90 per cent.). In Albania, strictly so called, most are Mohammedan, Catholics and Orthodox alike forming minorities. In Bosnia-Herzegovina, on the contrary, we find three groups, all very strong, though unequal in numbers: any two will outnumber the remaining one. In 1908, out of 1,900,000 inhabitants, 824,000 were Orthodox, 612,000 Mohammedan, and 433,000 Roman Catholics.

If you ask any one in the street, or in a railway carriage, in either province, what he is, he will no longer answer—"Mohammedan," or "Orthodox," or "Catholic": sometimes, indeed, he will not understand your question at first. Catholics describe themselves as "Croats," Orthodox as "Serbs," Mohammedans as "Turks." In other words, when they are questioned as to their belief, the term they use connotes a "nation," or even a "race." And yet this is a mere delusion; they are only one people, divided into three parties by creed alone. After the conquest of Bosnia by Mohammed II., in the fifteenth century, the aristocracy forsook its faith and passed over to Mohammedanism in order to retain its domains and privileges: ever since which period the contests between Christians and Mohammedans, and even, we are bound to add,

between the three creeds, have made up the whole history of Bosnia-Herzegovina, and are still at the root of all political questions, national and international. Behind the political and administrative façade erected by Austria-Hungary, symbolised by railway and telegraph lines, all either military or militarised, by fortifications and by barracks, etc., and personified by Austrian and Hungarian officials, we find, then, that there are three groups in Bosnia-Herzegovina : Turks, Serbs, and Croats. I am intentionally leaving on one side the two diminutive minorities of Jews (known as *Spagnoli* by reason of their Mediterranean origin), and Tsigans. These religious differences are clearly visible in the costume of the men, and still more in that of the women ; the Mohammedan women, of course, are only seen in the streets with their faces veiled, and their whole figure enveloped in a loose robe. But a close observer will notice that the fez is worn as frequently by Christians as by Turks ; and so also with the sash round the waist ; and Serbs and Croats wind white linen bands round their heads just after the fashion of Mohammedan turbans. In fact, the two provinces, and even districts within them, can show distinctions which are very nearly as obvious as those external ones that are occasioned by creed. It is particularly necessary to attend to the physical types of the locality, and of these you will be able to form an opinion from the illustrations which I shall place before you in future lectures. It is most striking to find to what extent Mohammedans, Serbs, and Croats resemble each other in profile, in bearing, and in all the main features of physique : between the girl children of the Mohammedans and those of Serbs and Croats I defy you to establish any distinction, physical or racial. Yet what differences exist, on the contrary, between those minorities to which I have just referred, the Spagnoli and the Tsigans.

The truth is that it is really one and the same race that is here represented by three religious groups ; all belong to the great Servian stock which, with the inhabitants of Servia, Montenegro, Dalmatia, Croatia, and the Diasporas constitutes a homogeneous whole of about ten millions of individuals. In Bosnia-Herzegovina there are three religions, but only one people. So too are there two alphabets, the Cyrillic and the Latin, but only one language, the Serbo-Croat, which is no other than Servian. The Mohammedans themselves, who call themselves Turks, are not only not Turks, but do not know a word of Turkish ; of the Arabian language they know equally little, and they are incapable of reading or understanding the Koran : all of them speak Servian.

Now, this unity of the Servian inhabitants of Bosnia-Herzegovina is borne witness to by the "essential facts" of Human Geography. Croats, Serbs, and Turks cultivate fruit-trees, especially plum-trees, in the same way, and also the two cereals, wheat and maize, which yield them the major part of their nutriment ; this is especially the case with the more important of the two, maize ; and they make and eat their "johnny-cakes" in the same way, too. They use the same plough and the same breeds of cattle and sheep ; also (Mohammedans, of course, excepted) of swine. In short, they lead the same lives, and at the great fair at Jajce in October I was able to verify how far the three groups do busi-

ness with each other without distinction of religion. Everything, therefore, points to community of race and origin.

Moreover—and here we come upon the complementary entity which throws into relief the specific characteristics of the fundamentals of Human Geography—these essential facts vary, without differentiation due to religious or ethnical causes, according as the geographical surroundings vary.

In a general way, and without any exact correspondence between the political and the natural boundaries, Bosnia is a country of Flysch hills still thickly wooded, more than half its surface being covered with forest: it resembles its neighbour Servia, which long bore the name of Choumadia, from *choumo*, a forest. It comprises the three valleys of the Vrbas, the Bosna, and the Drina, which run from south to north and fall into the Save: whereas through Herzegovina runs the essential portion of the valley of the Narenta, which, descending from the north-east to south-west, leads to the Adriatic, in other words, to the Mediterranean. Herzegovina is, to the south, a continuation of the Karst, and is a far hotter district: a country of limestone mountain masses, deforested and bare; characteristic Mediterranean scenery, hemmed in by grim grey rocks. Now to the wooded district belong the wooden Bosnian house, so dainty and so original, and likewise the wooden mill, the wattle fencing, the mosque with roof and minaret of wood. To the treeless, rocky district belong the stone house, roofed with broad and thick limestone slabs, the ancient Turkish fortified house, called a *koula*, the stone mill, walls of hewn stone, and the minaret of stone, tapering with needle-like fineness.

These "facts of observation" are obvious, and it seems a very simple matter to have noticed them. And yet, if you consult a conscientious compilation such as that which the *Revue Générale des Sciences* has put together with the help of a selection of learned men of the highest standing, or else a more specialised, but very detailed, book like the *Geologischer Führer* of Katzer, you will find no mention of such things.[1] Not only are they not accorded the place in the foreground to which they are entitled, but they are not even touched on.

The distinctive characteristic of a fact of Human Geography lies in its being a fact of the terrestrial surface which is seen to be a link between the facts of physics and the facts of human will. But it has been maintained that, whereas the attempt has been made to base Human Geography primarily on the observation of facts like the above, it abandons the intention of proceeding further or, if I may be allowed to phrase it so, to higher things. What a perversion! My idea is that in entering a house it is necessary to pass through the hall and ground floor, and that to gain access by way of the fifth, or even the fifteenth, floor is not really a convenient way. Bosnia-Herzegovina will show us, by means of facts of Human Geography, which are genuinely

[1] "Études scientifiques de la Revue Générale des Sciences en Bosnie-Herzégovine" (*Rev. Gén. des Sc.*, xi. 1900, pp. 269-402, 419-555); Fr. Katzer, *Geologischer Führer durch Bosnien und Hercegovina . . .*, Sarajevo, 1903.

geographical, what degree of distinction can be traced between Human Geography and political geography; and that is the first demonstration which I wished to put before you.

In subsequent lectures I shall analyse still further, and in detail, life as it is lived in Bosnia-Herzegovina, inasmuch as this country is, at present, typical. For the time being, allow me to anticipate matters, and indicate how the specific subject-matter of Human Geography leads on to the study of certain other subjects which, so far as their root principles are concerned form, within limits, integral parts of Human Geography.

"Human Geography certainly consists rather in the study of the material achievements of humanity than in the study of the races of humanity." Yes, these material achievements of humanity form the medium through which the geographer should see and study human beings. That is the special point of view which he ought to make his own. Does not this hasty and very brief indication that I have just given of certain facts of culture and of certain facts of habitation as regards Bosnia-Herzegovina put us in a better position to understand the racial unity and the community of method of living that exist among this tripartite Servian people than would any amount of phrases? While it obviously cannot serve as a description, it nevertheless throws light, geographically speaking. And once more, is it not the same sum-total of facts of the surface which constitutes the subject-matter of sciences so diverse as geography, ethnology, statistics, and sociology? Human beings and their achievements—those always, only the aspects vary, the aspects under which they are perceived and appraised. True as it is that every investigator in one of these branches of science cannot afford to ignore the chief results attained in kindred branches, it is no less true that we shall not be able to advance and prosper in the work that we do otherwise than by means of drastic specialisation and abolition of the "vaulting ambition" which tries to do everything at once.

Again, some of these essential facts serve to illustrate highly important events in diplomatic, military, and political history.

Ever since Austria-Hungary gained a hold in Bosnia-Herzegovina her efforts have been mainly concerned with the hemming in of Servia, and rendering it commercially dependent on the dual monarchy. Some of the clearest evidence of this tendency may be found in the south of Bosnia-Herzegovina, where the great natural highway runs from the Servian boundary at Mokra-Gora past Visegrad down to Foca and Bilec, reaching the Adriatic at Ragusa. By this route the Serbs' cattle could reach the sea in four or five days; it was a main road for exportation purposes. It has been closed. The closing of it has been rendered ever more and more effective, and for ten years or more Servia has been trying every means to regain her economic independence. That is how diplomats phrase it, but we should rather speak simply of a *via pecuaria*, a road which affords freedom of transit for her animals, and more particularly for her herds of swine. She has left no means untried; has endeavoured to send her animals across Hungary by rail; but Austria has increased the duties, and at times shut them out altogether at the frontier under pretext of epizootic diseases. She has also tried by way

of the Danube; but the Iron Gates are badly managed and, there too, the guardian is Austria again, who imposes such taxes that the traffic is rendered impossible.[1] All the Balkan crises of the last fifteen years have turned partly on questions of routes, and Servian politics in particular must be looked at from that point of view. An attempt has been made to "bottle up" Servia: the great natural highway which links up the valley of the Morava with the Adriatic has been padlocked, and it is only a question of time before the Servian armies will put forth all their strength in order to attain the coast, and re-open this route.

Now what are the relations between these economic maladies and these far-reaching realities of geography? And what relation do the former, perceived as they are more or less dimly and felt more or less keenly, bear to the formulae which designate them in the often hazy, and even inconsistent, language of rulers and diplomats? That is a problem for historians to solve; but it is for us geographers to say to the historian, "But for the closing of the road through Bosnia Herzegovina along which it was traditional for Servian live stock to be driven to the sea, things would undoubtedly be happening differently to-day." Geography has its revenge on politics; it takes time because its life is longer; but it often has the last word.

Had I time to spare, I would go on (always, however, remaining on Servian soil) to the Sanjak of Novi Pazar, a mountainous district which, in relation to the above subject, has been treated as a buffer between Montenegro and Servia, and which remains what it is, i.e., a sort of natural barrier. Germanism has had the desire to penetrate this district: has dreamed of continuing across this Sanjak the road from north to south which ought, in theory, to terminate at Salonica. But there is a problem to face here, how to turn a barrier into a route.[2] The Austrian staff have seriously considered geographical impossibilities, bearing in mind a war with Turkey, and I think I am in a position to state that the Austrian plans for invasion, from this point of view, would only allot a very small rôle to the Sanjak of Novi Pazar, even supposing the narrow-gauge line from Uvac to Mitrovica to have been completed: the chief military route would continue to be that of the great natural highway across Servia, Morava-Vardar.

The history of art ought likewise to take geography into account. Bosnia Herzegovina here too affords a typical example of this kind of dependence on geography, a dependence which has its limits, but is nevertheless real. A wooden minaret cannot take the same shape as a stone minaret. The wooden one broadens out to a noticeable extent at the height of the balcony, inasmuch as the latter, being of wood, must be protected: and the top is capped by a wooden shelter whose supports rest on the balcony: whereas the slender-stone spire can rise higher without any break in its tapering outline, for the balcony halfway up seems merely a girdle.

[1] Cf. J. Cvijic, *L'Annexion de la Bosnie et la Question Serbe*, Paris, 1909, pp. 4-16.

[2] Cf. "Le Sandjak de Novi Pazar," by Gaston Gravier, in the *Annales de Géographie*, Jan. 1913, pp. 41-67.

Nor can social history, the history of all organisations of societies, ignore the essential facts of Human Geography. In the later lectures we shall inquire into that primitive organisation of property in Bosnia known as the "zadruga," and we shall see, further, how all modern agricultural progress has combined to dissipate the setting in which that ancient mode of collective ownership existed, and that the latter is consequently on the wane.

(To be continued.)

SCOTTISH PLACE NAMES: REVISION OF ORDNANCE SURVEY MAPS.

In connection with the revision of the names of places appearing on the Ordnance Survey maps, there was appointed in 1891 a small Committee, under the auspices of the Royal Scottish Geographical Society, whose function was to advise on the forms to be adopted for the names of Gaelic origin. This Committee, presided over by Dr. James Burgess, C.S.I., met and worked from 1891 to 1899, when it lapsed.

Early in this present year, on the suggestion of Colonel C. F. Close, R.E., Director-General of the Ordnance Survey, the Committee was revived and reconstituted with Dr. W. J. Watson as Chairman, and Mr. John Mathieson, F.R.S.G.S., as Honorary Secretary.

The Committee, having considered its method of procedure, has decided to invite the co-operation of all interested in the subject of Place-names. For map purposes the Celtic names fall into two classes—(1) names presented on the map in Gaelic spelling: (2) names which, while of Celtic origin, are given on the map in Anglicised form. The latter class is large, even in districts where traditional Gaelic forms of the names are well known and in common use, and includes practically all postal addresses. For example, the Lewis name which appears on maps as Ardroil is in Gaelic *Eadar-da-fhaodhail*, meaning "between two sea-fords." It is important to note that for commercial reasons names of this class cannot, *as a rule*, be altered on the map.

(1) The Committee in the first place desires to have its attention drawn to names of the former class that are given incorrectly on the map, *i.e.* where the map spelling does not accurately represent the local pronunciation in Gaelic. When on investigation the Committee is satisfied as to the true form it will advise the Ordnance Survey authorities.

(2) With regard to the important class of Anglicised names the Committee is of opinion that although, as a rule, the names must be regarded for ordinary map purposes as stereotyped, it is nevertheless of great importance for philological and historical purposes that the genuine traditional forms as pronounced in Gaelic should be ascertained and preserved, and information on this subject is therefore invited. It may still be possible, for instance, to recover the traditional pronunciation in Gaelic of such names as Forteviot, Renfrew, Birnam, as well as names in

the counties of Kincardine, Forfar, Fife, Aberdeen, Banff, Elgin, Nairn, Dumbarton, and Stirling, which counties, though they have ceased in whole or in part to be Gaelic-speaking, yet adjoin or contain districts where the language is still in use.

(3) In addition, information is invited as to names omitted from the map or given imperfectly thereon, whether names of natural features, of divisions of land now merged in large holdings, of wells, graveyards, and artificial structures, or of districts the ancient names of which still survive in Gaelic, though they do not appear on maps. As an example of the last-named may be taken *An Toiseachd*, "the Thanedom" of Glen Lyon.

(4) With regard to the very large number of names of Norse origin occurring in or near Gaelic-speaking districts the Committee, recognising the importance for philological purposes of the forms these names have assumed in Gaelic, desires to obtain information here also as to the actual Gaelic pronunciation.

The gift or loan of papers and handbooks, guides, etc., embodying the results of investigations already made in any of the above departments will be welcomed.

In addition to communicating with the Ordnance Survey Department, the Committee have arranged for the publication of all decisions and authenticated information in the *Scottish Geographical Magazine*. Communications will be received by the Honorary Secretary, Mr. John Mathieson, addressed to the Royal Scottish Geographical Society, Synod Hall, Castle Terrace, Edinburgh, from whom also forms suited to the various departments of the inquiry may be obtained.

GEOGRAPHICAL NOTES.

America.

The Peninsula of Yucatan.—Mr. Ellsworth Huntington contributed to the *Bulletin* of the American Geographical Society for November last an exceedingly suggestive article with this title. The peninsula shows typical tropical conditions, and on a small scale illustrates most of the problems found in tropical countries. One special feature, discussed here already (vol. xxvi. p. 491), is the presence of limestone rock, giving rise to a characteristic karst type of country.

Taking the peninsula as a whole we find a northern belt clothed in scanty savanna forest (jungle), and a southern belt with true tropical forest. The difference Mr. Huntington believes is due not only to the marked difference in rainfall, which is scanty to the north and heavier to the south, but also to the severity of the seasonal drought in the north. The porous limestone of the north is also a contributing factor. The savanna region is well peopled, and prosperous, while the forest belt is scantily peopled by wild Indians. The difference, as in other parts of the tropics, seems to be due to the greater ease with which primitive agriculture can be carried on in the drier north. Here the

well-marked dry season leads to a periodic check to plant growth, and permits of the burning off of the natural vegetation without difficulty. Maize is the staple crop, the grains being inserted into holes made with a pointed stick. Small amounts of beans and pumpkins are also grown, while the prosperity of the region depends upon the plantations of henequen or sisal hemp, exported largely to the wheat growing regions of North America. The people, whether of Indian or Spanish blood, show a great lack of initiative and energy, but all, the Indians especially, are exceedingly clean and neat, the towns being stated to be models of cleanliness and order. The languor is apparently due to climatic causes, for it is noticeable that Spaniards who have recently entered the country are far more energetic than those who have been there for some generations. Further, it is commonly stated that labourers work harder than usual when the cool north wind blows, and Mr. Huntington believes that it is the uniformity of temperature throughout the year which has the debilitating effect. This is an interesting point in view of recent physiological observations on the lowering effect of unvarying temperatures in heated rooms and buildings. Another possible cause is malaria, which, especially in the forest region, is prevalent, and probably almost always affects the children in a mild form, which yet leaves permanent effects.

Mr. Huntington points out, further, that the present prosperity of Yucatan depends upon the demand, in the United States and elsewhere, for its henequen, a product which can be produced with relative ease. But the region formerly enjoyed a high degree of indigenous civilisation, the Maya Indians in the past having displayed great skill alike in obtaining water, in constructing temples and great buildings, and in cultivating the land. No reason has as yet been given to explain the development of such a civilisation in a region whose inhabitants are now so inert, and in a land which seems to lead to the degeneration of immigrant stocks.

Australasia.

Meeting of the Australian Association for the Advancement of Science.—This Association met at Melbourne in January last when several papers of geographical interest were read. Professor David discussed the Australian climate, with special reference to the meteorological observations made by the various Antarctic expeditions, notably those of Scott and Mawson. The observations obtained by wireless telegraphy from Macquarie Island, through members of Mawson's expeditions, show, he believes, that there is an intimate connection between the weather of Australia and that of the subantarctic region. It is hoped that an arrangement will be come to between Australia and New Zealand to insure the establishment of a permanent meteorological station on that island. Professor David believes that it is the existence of the lofty continent of Antarctica which produces the coldness of the Antarctic climate, and thus the marked contrast between south polar and equatorial temperatures. This again increases the rapidity of the air circulation in the southern hemisphere, and accounts for the periodic fierce

outrushes of blizzard winds, which accompany the development of Antarctic low-pressures, and profoundly affect Australian weather.

Another interesting address was delivered by Professor Baldwin Spencer on the Northern Territory and its Aborigines. Professor Baldwin Spencer had just returned from a special mission to the region, lasting a year. The territory is four and a half times as large as Great Britain, but excluding aborigines the total population does not reach 4000, and the aborigines probably do not number more than 40,000. The climate is certainly trying, especially in the wet season, which lasts from March to September, but it is less trying in the interior than on the coastal belt, and the fact that there is a distinct lowering of temperature in the "winter" season, makes the region differ from other tropical countries. The fact that the natives are totally ignorant of agriculture makes the problem of dealing with them very difficult, but the Commonwealth Government, which now has control of the region, is endeavouring to develop the country, and to find solutions for the various problems involved.

Tasmania and Antarctica.—Professor T. W. Edgeworth Davis contributes to the May number of the *Geographical Journal* a note on certain soundings taken by Captain J. K. Davis of Dr. Mawson's Antarctic ship *Aurora* on his voyage southwards last November and December. These soundings prove the existence of a submarine bank lying to the south of Tasmania. For 100 miles south of the island the bottom deepens steadily to 2082 fathoms, then it begins to rise again to the crest of a long ridge, at least 150 miles in length. So far as is yet known the shallowest part of the ridge has a depth of 545 fathoms, but as the ocean in adjacent areas to the east and west sinks to depths of from 2450 to 2700 fathoms, this speaks to a rise of at least 11,000 feet from the ocean floor. The ridge seems to be at least 100 miles in width, and has a rocky bottom. Professor Davis believes that it is a fragment of a lost continent which once connected Tasmania and Antarctica, and compares the deep trench which separates it from Tasmania to the smaller trench which forms Bass strait, and separates Australia from Tasmania.

Another bank was discovered about 60 miles north of Macquarie Island, this bank rising from a depth of 1750 fathoms to within about 570 fathoms of the surface.

Polar.

Captain Amundsen's North Polar Expedition. — Captain Amundsen has now obtained sufficient funds to insure the success of his proposed North Polar expedition. The Norwegian Geographical Society have contributed £8000, and the National Geographical Society of America, £4000. Captain Amundsen expects to start next spring from San Francisco or Seattle, and to be absent five years. He proposes to sail through Bering Strait, then allow the *Fram* to be frozen in the ice, and to drift across the Polar Basin to the Atlantic.

The American Crocker Land Expedition.—This expedition, which was postponed last year (cf. vol. xxviii. p. 479 *et antea*) on account of the death of the leader, has been reorganised and expects to start for the north during the coming month (July). Mr. Donald B. Macmillan is to be leader, Ensign Fitzhugh Green, U.S. Navy, is to have charge of the mapping, electrical work, terrestrial magnetism and seismology, while the other members of the party are to be Messrs. W. Elmer Ekblaw (geologist and ornithologist), and M. C. Tanquary (zoology, especially invertebrate zoology). The object of the expedition is the scientific exploration of the land supposed to lie north-west of the line of islands stretching from Grant Land to Prince Patrick Land. In addition to the mapping of the new land and of the uncharted coast lines in the vicinity of Grant Land and Axel Heiberg Land, the party will make investigations in the meteorology, terrestrial magnetism, seismology, geology, botany, zoology, ethnology, etc., of the regions visited.

General.

A Tropical University.—Some correspondence has taken place lately in the press on the advisability of establishing a University in the tropics to investigate the many problems which present themselves there, and also to serve as a training school for those who propose to spend a part of their lives in the tropics. Various localities have been suggested, but Mr. Kirkham, of Nairobi Government Laboratory, communicates to *Nature* for April 24, a letter in which he puts forward a strong case for Nairobi, and in the course of his letter sums up in an interesting fashion some of the characteristic features of British East Africa, a region with many peculiarities. He points out that the region is dissected by the equator, rises from sea-level to a plateau region with an average height exceeding 8000 feet, and includes a mountain of 17,000 feet in height, rising far above the snow line. The climatic conditions vary greatly: there are regions of heavy rainfall and almost rainless deserts; healthy districts and others rendered uninhabitable by deadly disease. Again the soils vary greatly, and the crops range from coffee, rubber, cocoanuts, to cotton, maize and wheat. The country contains a rich fauna and flora and a large native population, and is within easy reach of India. Nairobi itself has a healthy climate, is placed within a hundred miles of the equator, and is about equidistant by rail from the tropical coast belt and the Victoria Nyanza and Uganda.

Origin of certain Submarine Valleys—Mr. Cyril Crossland contributes to *Nature* an interesting note on certain submarine valleys in the Red Sea and equatorial East Africa. He states that such harbours as Port Sudan, Suakin, the desert harbours of the Red Sea, no less than those of Mombasa, Kilindini, Tanga, Wasin, etc., are really the high parts of submarine fault valleys, and not, as might be supposed, drowned river valleys. More than this, the numerous fiords on the west coast of the island of Pemba are, he states, similarly rift valleys,

for the island has undergone recent elevation, not depression. Off both Pemba and Zanzibar, also, there occur barrier coral reefs which owe their origin to abrasion alone, and not, as is usually assumed with barrier reefs, to subsidence. There is of course nothing intrinsically improbable in these statements, for if, as is admitted, faulting may produce steep-sided valleys on land, as in the case of the Great Rift valley of Africa, there is no reason why it should not also produce steep-sided submarine valleys, but the precise statements made are of considerable interest, and, if well founded, show the danger of assuming subsidence wherever submarine valleys or barrier reefs occur.

The Piltdown Skull.—In the February issue (p. 94) we noted the discovery of a new type of human skull at Piltdown, Sussex. A full report of the proceedings at the meeting of the Geological Society when the skull was described appears in Part I. of the current volume of the *Quarterly Journal* of that Society, and is accompanied by numerous illustrations. Those interested in the matter are referred to that journal for fuller details than can be given here. We may note, however, that Dr. Smith Woodward regards the skull as sufficiently peculiar to justify the erection of a new genus, and believes that it forms a link between the higher apes and man, for it presents certain features shown in the earlier stages of the growth of the skull of the living apes. It is probable that these features occurred in Mid-Tertiary apes, from which man and the living apes doubtless arose.

Geological Structure of Continental Shelf.—Under the rather startling title of "The Geology of the Sea-bottom," Dr. Lemoine contributes to the *Annales de Géographie* for November last an interesting summary of some recent researches on rocks dredged from the sea-bottom off the coast of Europe. These recent investigations have shown that rock specimens of cretaceous and eocene age lie over the floor of the English Channel in numbers sufficient to justify the conclusion that they are fragments of rocks *in situ*. The observations are of interest as they serve to confirm conclusions arrived at on theoretical grounds in regard to the probable structure of the Channel region. Off the western coastline of Europe specimens of eruptive rocks have been found in sufficient numbers, according to Dr. Lemoine, to lead to the conclusion that a line of fracture, marked by eruptive rocks, runs from the south of Portugal to Rockhall, and forms the western boundary of the continent of Europe. These observations, of course refer only to the Continental Shelf, regarded by all geologists as structurally a part of the continent of Europe. Dr. Lemoine, however, believes that it may not be impossible to obtain rock specimens from the great ocean depths, and thus investigate the geological structure of the sea-floor beneath the covering of ooze.

Commercial Geography.

Agricultural Developments in Uganda.—Mr. P. H. Lamb contributes an article with this title, based upon personal experience,

to the *Bulletin* of the Imperial Institute. He points out that the cotton and most of the other products grown for export are cultivated in Uganda at an elevation of 3000 feet and over, in a plateau region close to the equator, with a rainfall of 40 to 60 inches per annum, and a remarkable equable temperature. The population comprises about 3,000,000 persons, and the Baganda, the principal tribe, are remarkably progressive, and take naturally to trade.

The cotton industry is especially interesting. The Agricultural Department has been making strenuous attempts to improve the yield, and found that occasional European inspection did little to eliminate native errors of cultivation. A number of native cotton instructors have therefore been trained and appointed, and, with the co-operation of the chiefs, these have done excellent work, and as their districts are small they are able to visit the various villages frequently and see that their instructions are carried out. Cotton cultivation is practically all in the hands of the natives, the crop being collected and purchased by small Indian traders, and ginned and exported by European firms. Seed can only be obtained through the Department, and the plant is grown as an annual in order to check insect pests, and prevent stained and dirty cotton being put upon the market. The crop is grown by the natives as a "money crop," to give them the means of buying wives and cattle, which to them constitute wealth. The crop is exceedingly popular with the natives, and its further development is only checked by difficulties of transport, the local demand being as yet unlimited. Ground-nuts and sesamum are also important crops, and are encouraged by the Department as yielding a concentrated food-supply, useful in case of famine or a sudden demand for extra labour for public works. Wheat is also grown on the foot-hills of Ruwenzori, and, though the yield is small, twelve bushels to the acre, it is believed that in certain regions the crop is capable of further development.

Elephant Grass and Paper-making.—A note in the *Bulletin* of the Imperial Institute, 1, suggests the possibility of the establishment of a new industry in Uganda, owing to the use of elephant grass for paper pulp making. Elephant grass (*Pennisetum purpureum*) is a member of the millet genus, and grows wild throughout a wide zone in tropical Africa, extending from 10° N. lat. to 9° S. lat. on the west coast, and from 9° to 20° S. lat. on the east coast. It occurs chiefly along watercourses and marshy depressions, and reaches a height of 6 to 10 feet, or occasionally even 20 feet. To agriculturists it is a great nuisance, in spite of the fact that it can be used as a fodder plant both for horses and cattle, owing to the rapid way in which it grows after the aërial shoots have been burnt or cut down. A bundle was recently sent to the Imperial Institute with a view to testing the grass's possibilities as a pulp-maker. The results were fairly satisfactory, but it is pointed out that the grass is too bulky in proportion to its probable market value to permit of profitable shipping to Europe. If, on the other hand, it could be converted into pulp by the soda process on the spot, it is possible that a remunerative industry might be carried on. In an

article in the *Times* it is pointed out that there are immense deposits of soda in east Africa, so that there is a possibility that a pulp industry might be successfully started in Uganda.

EDUCATIONAL.

Vacation Courses at Hamburg.—We have received a programme giving full details of vacation courses to be held at Hamburg during the present summer from July 24 to August 6. The programme is a very elaborate one, and in addition to courses which touch more or less upon the province of geography, we notice the following which are of very special interest to geographers:—Professor E. V. Drygalski is to lecture on "Probleme der Eiszeit in den Polargebieten und in den Alpen"; Professor W. Branca on "Gegenwärtiger Stand, Aufgaben u. Ziele vulkanologischer Forschung; Dr. Ehrenbaum on "Die Internationale Meeresforschung"; Professor Meinardus on "Probleme des Kreislaufs des Wassers"; Professor Passarge on "Geomorphologische Probleme u. Streitfragen"; Professor Pfeffer on "Die grossen tiergeographischen Probleme"; Professor Schott on "Ergebnisse, Probleme u. zukünftige Aufgaben der Morphologie der Meeresräume, and so on.

In addition to the various courses of lectures, special practical courses in German for foreigners have been arranged, and will be held for three to four hours daily from June 16 to July 26. These will give students an opportunity of studying the language according to the most approved modern methods. The fee for the lecture courses is 25 marks, with a supplement of 50 marks for those taking the practical German course. Applications should be sent to Geschäftsstelle der Akademischen Ferienkurse zu Hamburg, Martinistrasse 52, Hamburg 20.

NEW BOOKS.

EUROPE.

Ski-Runs in the High Alps. By F. F. Roget, S.A.C., Honorary Member of the Alpine Ski Club, etc. With 25 Illustrations by L. M. Crisp, and 6 Maps. London and Leipzig: T. Fisher Unwin, 1913. *Price* 10*s.* 6*d. net.*

Let us say at once, before beginning to find fault, that we have read Professor Roget's book with pleasure, and have derived from it some instruction and much entertainment. We especially enjoyed the accounts of the ascents of the Finsteraarhorn, the Grand Combin, and of the "high-level route" to Zermatt. In pleasantly discursive fashion hints are given to beginners, the mechanics of ski-bindings are discussed, and a few notes are added on Swiss winter resorts. The illustrations are curiously unequal, and present the appearance of having been drawn from photographs. The maps are reproduced from those of the Swiss Topographical Survey, and are on such a small scale as to be practically worthless. There is no index, but the chapters have good detailed headings. We must emphatically protest against Professor Roget's pronunciation of the word "ski."

He uses no *s* in the plural, which is reasonable enough, but he insists on calling it "skee," on the ground that it is so written and also that it is good Norse. Now both in Norwegian and Swedish *k* is like *h* before the letter *i*. May we ask Professor Roget if he knows how the name of the Swedish explorer Nordenskiöld is pronounced?

The Story of Lucca. By Janet Ross and Nelly Erichsen. Illustrated by Nelly Erichsen. London: J. M. Dent and Sons, Limited, 1912. *Price* 4*s.* 6*d. net.*

This is a further addition to the Mediæval Town Series, and will be quite as acceptable as any of its predecessors. Lucca, as the authors say, is too little known to the public. For one thing, it is slightly out of the beaten track down the coast from Genoa, and it is overshadowed by its old rival, Pisa. And yet it ought to have a claim on English-speaking travellers. Historically it has always had a connection with Great Britain, and many of our famous men of letters have resorted thither for the baths. Students of Dante cannot go far without hearing of the wars between Pisa and Lucca, the grim memory of Ugolino della Gherardesca, and the more pleasant reference to Nino Visconti. Lucca has been rather more famed for its religious tendencies than for its art, and yet there is much of the highest interest in the buildings and their associations. William the Conqueror, it is said, when he was planning his invasion of England, sent ambassadors to the Pope for his blessing, and it was at Lucca that they met him.

As has been said, the high standard of these publications and of the illustrations has been fully kept up.

The Cities of Lombardy. By Edward Hutton. With 12 Illustrations by Maxwell Armfield. London: Methuen and Co., Limited. *Price* 6*s.*

In order rightly to understand the history of Italy itself it is necessary to give the Plains of Lombardy and their inhabitants their due measure of importance. Two points are brought out in the introductory chapter which should be borne in mind. The people inhabiting the valley of the Po are not, ethnologically speaking, Italian at all. Their country was known as Cisalpine Gaul; they were and are Gauls rather than Italian. These Gauls in the dawn of history poured into Italy by the various passes which cross the Alps. A brave and warlike race, they, having settled down, acted as a buffer state to protect Italy proper from foes from the north, and although wave after wave of invasion passed over them to Rome, the barbarian was finally driven out by another great Gaul, Charlemagne; and the people remain Gauls to this day, constituting probably the cream of the army. The other point on which the author enlarges is that it was when Julius Cæsar finally took Gaul, both Cisalpine and Transalpine, that the *Pax Romana* was established which made the civilisation of Europe, as we have it to-day, possible. The first four centuries of our era were the great and indestructible foundations of all that is worth having in the world. The descriptions of the various cities of Lombardy are as thoughtful as Mr. Hutton's always are. The illustrations are uncommonly good, and give an excellent idea of the colour of the country.

The Russian Year-Book for 1913. Compiled and edited by Howard P. Kennard, M.D., assisted by Netta Peacock. London: Eyre and Spottiswoode. *Price* 10*s.* 6*d. net.*

This edition takes a much more handy and compact form than last year's volume. The pages are only slightly fewer, but the paper is much thinner, and

the book altogether much easier to work with. The general arrangement remains the same, but there are various minor additions, space being found *e.g.* by the omission of the Russian vocabulary (oddly enough, this remains in the index but not in the text), of the scheme for the transliteration of Russian, and so on. We think the author is right in these omissions and in the slight reduction of size, and hope that in future he will limit the contents strictly to those matters which are naturally looked for in a Year-Book and cannot easily be found elsewhere. The book is a wonderful storehouse of facts about an empire in regard to which details have hitherto not been easy to obtain. Among the additions to the 1913 edition are some instructive diagrams showing the distribution and quality of cereal crops in European Russia in 1912. To those teachers whose scholars still regard Siberia as an unpeopled waste we may recommend the study of the population statistics, which shows that its population exceeds that of Canada by one million.

Greece of the Twentieth Century. By Percy F. Martin, F.R.G.S. London: T. Fisher Unwin, 1913. *Price* 15*s. net.*

Certainly the reader who peruses this book will endorse the encomium of the learned Dr. Andréadès who contributes the introduction, and will admire the patience and industry of Mr. Martin in its compilation. We trust we are not unjust to it when we describe it as a glorified Whittaker combined with a strong dash of Baedeker. It gives detailed information about the Royal Family of Greece, government, army, navy, finance, government offices, railways, agriculture, shipping, mining, etc., going into such minutiæ as the careers of every member of the Cabinet, the numbers and distribution of the officers and rank and file of the army, primary schools, bishops, monasteries, etc. In the chapters on railways we have details such as the gauge, bridges, tunnels, and rolling stock of each line. In domestic affairs we have the wages paid to men, women, and children in factories, the pay of domestic servants, their dress, and so on. Abundance of statistics are given as to population, economic productions, prices, imports, exports, etc. Even the prices of seats in the theatres, tram-cars, retail groceries, and refreshments are duly set down. In brief, the reader can inquire within this book on every subject, important and unimportant, connected with the Greece of to-day and be sure of finding an up-to-date answer.

ASIA.

Through Shên-Kan. By Robert Sterling Clark and Arthur de C. Sowerby. Edited by Major C. H. Chepwall. London: T. Fisher Unwin, 1912. *Price* 25*s. net.*

This handsome and beautifully illustrated volume contains an interesting, if somewhat belated, account of an expedition through a part of the Chinese provinces of Shansi, Shensi, and Kansu in the years 1908-9. The expedition was projected by Mr. Clark of New York. He proposed to start from the terminus of the Pekin railway, T'ai-yüan Fu in Shansi, to traverse Shensi and Kansu, skirt the Tibetan border to Ch'êng-tu-Fu in Suchwan, descend the Min river to Sui-Fu, and return to Shanghai down the Yangtse river. In the course of the expedition it was intended to survey the route, and to take astronomical observations of latitude and longitude of the important towns as well as daily meteorological observations. Mr. Clark secured for the expedition a staff of competent workers, the most important of whom was Mr. Sowerby of the Smithsonian Museum, whose previous experience of China, and more especially of Shensi, marked him as

peculiarly qualified for the work. The expedition started in September 1908 and proceeded due west to Yu-lin Fu by the Great Wall of China, thence south to Fu-Chou, and thence again west to Lan-Chou. Up to the middle of June 1909 the party had met with no misadventure, and the work was making satisfactory progress, but on the 21st of that month Hazrat Ali, the surveyor of the expedition, was treacherously murdered in the neighbourhood of Lan-Chou, under circumstances which are still more or less shrouded in mystery. The expedition was then summarily brought to a close, and the party returned to Pekin. The most valuable parts of the report are the chapters dealing with the biology, meteorology, and geology of the tract. There is also a valuable route map, which cannot fail to be of much service to future explorers. To many readers the most interesting feature of the book will be the many beautiful illustrations, some of them in colour. The story of the expedition is another illustration of the danger of travelling in Northern China without a sufficient escort.

A New Account of East India and Persia. By JOHN FRYER. Edited with Notes and an Introduction by WILLIAM CROOKE, B.A. Vol. II. London : Printed for the Hakluyt Society, 1912.

In the *Scottish Geographical Magazine*, vol. xxvi. p. 211, we gave some account of the life and career of John Fryer and of the first part of his travels in East India and Persia in 1672 to 1681. In the volume now before us we have a continuation of his narrative, dealing with the Carnatic in the days of Sivaji, the Mahratta freebooter who was a thorn in the side of the fanatic Moghal Emperor Aurangzeb, and with Persia, where Fryer travelled from Bandar Abbas to Ispahan, via Shiraz, and back. Not the least important chapter in the book is one which describes the coins, weights, and precious stones found in the places trading with the East India Company. Fryer is an acute and accurate observer and collector of information, and what he records has been confirmed by other travellers. As in the first volume, Mr. Crooke's editorial notes are copious and illuminating.

AFRICA.

The Gambia. By HENRY FENWICK REEVE. With Illustrations and Maps. London : Smith, Elder and Co., 1912. *Price* 10*s.* 6*d. net.*

This is a curious book, whose object is stated by Mr. Reeve in the Preface to be "to give his own people and Government a true perspective of the Colony of the Gambia, its value to the British Empire, and, above all, a clear view of their obligations as a Great Nation, towards those who have been our loyal fellow-subjects for more than three centuries." The author, whose love of metaphor runs away with him at times, "claims the indulgence of those who wield the facile pen and the purple pencil." His book is divided into three parts—(1) historical ; (2) geographical, geological, and ethnical ; (3) natural history. Under geology we learn that "the ocean is the source of the power that has in the past laid down the sedimentary series of rocks, and afterwards acted upon them with erosive force to form the valley of to-day and change it to its present conditions." Then we have a chapter headed "The Amphibians of the Gambia," which begins with the statement that "of the amphibians of the Gambia the hippopotamus takes the pride of place, as the largest and perhaps the most interesting." As the chapter goes on to describe the manatee and a porpoise, crocodiles, turtles, a "species of the otter tribe," and so on, it is evident that the author's statement that he speaks from a "popular point of view" is fully borne out.

AMERICA.

The Sea and the Jungle. By H. M. Tomlinson. London: Duckworth and Co., 1912. *Price 7s. 6d. net.*

In December 1909 Mr. Tomlinson, who seems to have got tired, temporarily at least, of the conventionalities of home life, signed on as purser in a "tramp" steamer carrying coals from Swansea to Porto Velho on the Rio Madeira, a tributary of the Amazon, and in this well-written volume we have an account of the voyage, and of his companions at sea and at Porto Velho, where he made one or two excursions into the interior. Porto Velho is the spot on the Rio Madeira where supplies and materials are taken for the construction of the Madeira-Mamore railway, which is intended to open up Bolivia and provide an outlet for its products to the Atlantic via the Amazon. Two abortive attempts have already been made to construct this railway. In both cases the enterprise failed owing to the inability of the employees to resist the fatal malaria of the tropical forest in which they had to work. If we understand Mr. Tomlinson aright, it is to be feared that this third attempt will not be more successful. The interest of the book consists in the powerful description it gives of the scenery of the Amazon and its tributaries, and of the impenetrable forest on both sides of the rivers. There are also some cleverly written sketches of the strange types of men with whom Mr. Tomlinson chanced to come into contact here and there in the cruise, and we have vivid and thrilling descriptions of the terrors of the tropical forest, and especially of its insect life. Mr. Tomlinson has a keen eye for animal life, and has much to say on the beauty of the butterflies and some of the birds in these regions. On the return journey he left the "tramp" at Tampa, in Florida, and hurried back to England. We heartily commend this book to the perusal of our readers.

The True History of the Conquest of New Spain. By Bernal Diaz del Castillo. Edited and published in Mexico by Genaro García. Translated into English with Introduction and Notes by Alfred Percival Maudslay M.A., D.Sc., London. Printed for the Hakluyt Society, 1912.

In this, the fourth volume of his *True History of the Conquest of New Spain*, Bernal Diaz brings his story down to the siege and capture of Mexico, and the subsequent proceedings of Cortes for the purpose of subduing and settling the adjacent territories. The artless but candid old soldier indulges in somewhat wearisome details, but his narrative throws valuable, although at times lurid, light on the doings of Cortes and his companions, and on the endless intrigues and counter-intrigues which prevailed at the court of the Spanish Emperor. Diaz acknowledges the valour and generalship of Cortes, but repeats with illustrations accusations against his personal capacity and neglect of the comrades who had contributed so much to his success. As in the former volumes, Mr. Maudslay's notes are valuable and illuminating.

GENERAL.

Commodore Sir John Hayes. By Ida Lee. London: Longmans, Green and Co., 1912. *Price 7s. 6d. net.*

Ida Lee has done good service in rescuing from the unmerited oblivion of the Bombay Secretariat the story of the life of Sir John Hayes. His career, especially in the early stages, was one which may well be the envy of every young officer in the British Navy to-day. Born in 1767, he joined the Bombay Marine at the age

of thirteen, and served in the first war against Tippoo Sahib, the son of the redoubtable Haidar Ali, in 1783. After serving in various ships from Bussora, in the Persian Gulf, to Canton, he took part in the second and decisive war which annihilated the power of Tippoo Sahib. These were the palmy days when John Company had no objections to his servants doing a bit of trading on their own account; and Hayes, who had heard of a chance from a friend, John M'Cluer, formed a syndicate for an expedition to New Guinea, where M'Cluer had seen plenty round nutmegs, which then commanded high prices in various markets. The syndicate chartered two small ships, which started under Hayes' command in 1793. Contrary winds compelled them to go round by the west coast of Australia to Tasmania. In this course Hayes was unwittingly following the track of Bligh and the French Admiral D'Entrecasteaux, who was searching for traces of La Perouse. From Tasmania he sailed on to New Caledonia and the Louisiade Archipelago, and arrived at New Guinea, where he coolly took possession of the whole island in the name of King George III., built a fort, and settled a number of his followers so as to make the occupation effective. He then sailed for Calcutta, but had to make for Canton in order to escape from a French privateer. In Canton he sold his nutmegs to great advantage. On his return to Calcutta he reported his annexation of New Guinea, but to his great chagrin the Governor-General, Sir John Shore, repudiated his action, as New Guinea was too far away from India to be of much profit to the Company. Hayes rejoined the Indian Marine, and saw active service against the French and the pirates who infested the Gulf of Bombay and the Arabian seas. He also took an active part in the Dutch War, ended by the siege and capture of Ternate in 1801. Two years later he was put in command of a squadron to protect the Roads and Bay of Bengal. After a short furlough to England he returned to Calcutta as Deputy-Master Attendant of the port, but was sent with the expedition to Java in 1811, where he took part in the siege and capture of Batavia. After this he had a long spell of rest, during which as Master Attendant of the port of Calcutta he introduced many improvements in its administration. When war was declared with Burma in 1824 Hayes went with the expedition, and did good service at the siege and capture of Arakan. For these services he was knighted, and he continued to reside in Calcutta, where his health gradually gave way. In 1831, in quest of good health, he went on a voyage to New South Wales, but had to be landed on one of the Cocos Islands, where he died, finishing peacefully an adventurous, gallant, and useful career, fully justifying the eulogistic stanzas of Agnes Strickland, which appear for the first time in this volume. Ida Lee has done her part well. She has made a patient and conscientious study of all the sources of information available to her, and she uses her materials skilfully and judiciously, and with the generous enthusiasm and admiration which her hero justly evokes. This book will be welcomed certainly by every sailor, and also by all who are proud of the glories of the British Navy.

Lippincott's New Gazetteer: A Complete Pronouncing Gazetteer or Geographical Dictionary of the World. Edited by Angelo Heilprin and Louis Heilprin. London: J. B. Lippincott Co., 1912. *Price* £2, 2*s. net.*

This new issue of a well-known work of reference differs from its predecessor of 1905 only in the addition of an appendix containing the results of the Thirteenth Census of the United States. We regret that space was not also found for the results of the 1911 census in Canada, which brought to light so many striking changes in the distribution of population.

Half-Hours in the Levant: Personal Impressions of Cities and Peoples of the Near East. By ARCHIBALD B. SPENS. London: Stanley Paul and Co., 1913. *Price* 1*s. net.*

This is a detailed diary of various pleasure cruises in the Mediterranean, illustrated by numerous photographs. It scarcely appears to us to have deserved publication.

EDUCATIONAL.

Ordnance Survey Maps: their Meaning and Use. By MARION I. NEWBIGIN, D.Sc. (Lond.). Edinburgh and London: W. and A. K. Johnston, 1912. *Price* 1*s. net.*

The object of this little book—the first of its kind published in this country—is to explain how the one-inch Ordnance Map can be used to the best advantage. The author shows how the geological features of a country can be discerned, such as, consequent, subsequent, and obsequent, rivers; the effects of ice, the erosion of corries, or cirques, and the general shaping of the land by the various agencies at work. How to measure the gradients from the contours is explained, and how the human geography of the country can be studied. For the purpose of illustration four sheets are selected in Scotland, and four in England. The Scottish sheets explained are—Haddington, Oban with Ben Cruachan, Balmoral district, and Ullapool district, in Ross-shire. No better selection could be made as typical examples of the scenery of Scotland. The English sheets are equally well chosen. It is regrettable that, owing to the cost, only one small diagram Ben Cruachan, and one photograph are given. Let us hope that the Government departments concerned—the Ordnance Survey and the Geological Survey—will imitate the American and German departments, who, we understand, supply the plates for such publications.

The delineation of physical features on the one-inch O.S. map was observed by Sir A. Geikie, who says: "The varying forms of the surface are so faithfully delineated as frequently to indicate, to a trained observer, the nature of the rocks and the geological structure of the ground. The individual characteristics of schist, of granite, of quartz rock, of slate are often well depicted." A careful study of this little volume, together with the maps, will enable the student and the amateur to see, to some extent, what the trained geologist sees in these maps. The author complains that the O.S. maps are only contoured at 250 feet intervals above the 1000 foot line, but she also states that this is to be remedied. This is obviously a defect; for many of the minor peaks are not indicated except so far as the hachures suggest them. A glance at sheet 5 of Scotland, where the contours are given at 100 ft. intervals to the summits, will show the advantage of adopting a uniform interval. Attention is also called to the fact that while the contours for the sea-bed are shown, there is nothing to indicate the depths and contours of the inland lakes. This also leaves the map somewhat incomplete, especially for those who wish to use it for physical geography. For instance, to know that Loch Morar—the surface of which is only 30 ft. above sea-level—is 1017 ft. deep—deeper than any part of the sea within 100 miles, and that Lochs Ness and Lomond are respectively 751 and 623 ft. deep—both much below any portion of the adjacent sea, would greatly assist the student in constructing the original valleys.

During recent years, however, much has been done to make the maps more useful both to the scientist and the general user. They are published both in colour and engraved. The class of every road, the position of every post office and

railway station are given. Woods are indicated, both coniferous and deciduous; ornamental, pasture, and rough pasture are clearly shown; and under the present policy of the Department the executive would doubtless be willing to consider any suggestions for the further improvement of these maps.

To many the chapters dealing with the human geography will be of most interest. The sparse population must not always be taken as due to the want of fertility of the land. In Scotland there is very little cultivation above the 800 ft. level, except such small patches as one meets with at Leadhills and Wanlockhead, 1300 ft., at Tomintoul, where there are crofts at 1400 ft., and a small patch at Sir John Stirling Maxwell's Lodge on Rannoch Moor, 1730 ft. There are, however, many fertile valleys in the Highlands of Scotland now devoted to deer, which supported a considerable population a hundred years ago.

The title "Ordnance Survey Maps" is slightly misleading, for the author deals only with the one-inch map; but a reference to the catalogue of the O.S. Maps will show that the Department publishes maps on about a dozen different scales, varying from 16 miles to an inch, to 10 ft. to a mile.

BOOKS RECEIVED.

The Battlefields of Scotland: Their Legend and Story. By T. C. F. Brotchie, F.S.A. (Scot.). With sixty drawings by the author. Demy 8vo. Pp. ix + 242. Edinburgh: T. C. and E. C. Jack, 1913. *Price* 5*s. net.*

The War of Quito: by Pedro de Cieza de Leon and Inca Documents. Translated and edited by Sir Clements R. Markham, K.C.B. Demy 8vo. Pp. xii + 212. Cambridge University Press: John Clay, M.A., 1913.

The Life of a South African Tribe: II. The Psychic Life. By Henri A. Junod. Demy 8vo. Pp. 574. London: Macmillan and Co. Ltd., 1913. *Price* 15*s. net.*

A Naturalist in Cannibal Land. By A. S. Meek. Edited by Frank Fox. With an Introduction by The Hon. Walter Rothschild, and thirty-six Illustrations. Demy 8vo. Pp. xi + 238. London: T. Fisher Unwin, 1913. *Price* 10*s.* 6*d. net.*

Panama: The Creation, Destruction, and Resurrection. By Philippe Bunau-Varilla. Royal 8vo. Pp. xvii + 568. London: Constable and Co. Ltd., 1913. *Price* 12*s.* 6*d. net.*

The Fringe of the East: A Journey Through Past and Present Provinces of Turkey. By Harry Charles Lukach. Demy 8vo. Pp. xiii + 273. London: Macmillan and Co. Ltd., 1913. *Price* 12*s. net.*

The Story of Belfast and its Surroundings. By Mary Lowry. With over thirty Illustrations. Demy 8vo. Pp. 191. London: Headley Brothers, 1913. *Price* 7*s.* 6*d. net.*

Things as they are in Panama. By Harry A. Franck. Illustrated. Demy 8vo. Pp. iv + 314. London: T. Fisher Unwin, 1913. *Price* 7*s.* 6*d. net.*

A Text-Book of Geography: Practical and Physical. By Ronald M. Munro, M.A. Crown 8vo. Pp. 480. Edinburgh: John Cormack, 1913. *Price* 3*s.* 6*d. net.*

Dent's Practical Notebooks of Regional Geography. By Horace Piggott, M.A., Ph.D., and Robert J. Finch, F.R.G.S. Book II. *Asia.* Crown 4to. Pp. 64. Book III. *Africa.* Crown 4to. Pp. 48. London: J. M. Dent and Sons, Ltd., 1913. *Price* 6*d. net each.*

Handbook of Baltic and White Sea Loading Ports, including Denmark. By

J. F. Myhre. Revised edition. Pp. 576. Demy 8vo. London: Rider and Son, Ltd., 1913. *Price* 21*s. net.*

Rouen: Étude d'une agglomération urbaine. Par J. Levainville. Avec 24 figures dans le texte, 1 carte, 1 plan de Rouen. Demy 8vo. Pp. 418. Paris: Librairie Armand Colin, 1913. *Prix* 7 *fr.* 50.

Svenska Turist-Föreningens Årsskrift 1913. Med Trehundratjugusätta Illustrationer Och Fyra Kartskisser. Demy 8vo. Pp. viii + 404. Stockholm: Wahlström and Widstrand, 1913. *Pr.* 4 *Kr.*

Burma Under British Rule. By Joseph Dautremer. Translated, and with an introduction, by Sir George Scott, K.C.I.E. With 24 Illustrations. Demy 8vo. Pp. 391. London: T. Fisher Unwin, 1913. *Price* 15*s. net.*

A Commercial Geography of the World. By Frederick Mort, M.A., B.Sc., F.G.S. With numerous Maps and Diagrams. Crown 8vo. Pp. viii + 392. Edinburgh: Oliver and Boyd, 1913. *Price* 2*s.* 6*d.*

L'Eritrea economica. By Ferdinando Martini and others. Illustrated. Royal 8vo. Pp. xiv + 542. Novara—Roma: Istituto Geografico de Agostini, 1913. *Prezzo L.* 16.

A Turkish Woman's European Impressions. By Zeyneb Hanoum. Edited and with an Introduction by Grace Ellison. Illustrated. Crown 8vo. Pp. xx + 246. London: Seeley, Service and Co., Ltd., 1913. *Price* 6*s. net.*

Naples and Environs: Mount Vesuvius, Pompeii, Sorrento, Amalfi, Ischia, and Capri. A Practical Guide (Grieben's Guide Books). Vol. 166. With 5 Maps and 3 Ground Plans. London: Williams and Norgate, 1913. *Price* 1*s.* 6*d. net.*

Athènes (Les Villes d'Art célèbres). Par Gustav Fougères. Crown 4to. Pp. 204. Paris: Librairie Renouard, 1912.

The Highways and Byways of England: Their History and Romance. By T. W. Wilkinson. Crown 8vo. Pp. xxiii + 270. London: Iliffe and Sons, Ltd., 1913. *Price* 4*s.* 6*d. net.*

The British Empire with its world setting. By J. B. Reynolds, B.A. Small Crown 8vo. Pp. viii + 200. London: A. and C. Black, 1913. *Price* 1*s.* 4*d.*

Spain and Portugal. By Karl Baedeker. With 20 Maps and 59 Plans. Fourth Edition. Leipzig: Karl Baedeker, 1913. *Price* 15*s. net.*

The Statesman's Year-Book: Statistical and Historical Annual of the States of the World, for the Year 1913. Edited by J. Scott Keltie, LL.D. Fiftieth Annual Publication. Revised after Official Returns. Crown 8vo. Pp. xcvi + 1452. London: Macmillan and Co. Ltd., 1913. *Price* 10*s.* 6*d. net.*

Walch's Tasmanian Almanac for 1913. With Map of Tasmania. Fifty-first Year of Publication. Crown 8vo. Pp. 432. J. Walch and Son, Ltd.

Victorian Year-Book for 1911-12. By A. M. Laughton, F.I.A., F.F.A., F.S.S. Thirty-second Issue. Melbourne, 1913.

Trade and Customs and Excise Revenue of the Commonwealth of Australia for the Year 1911. Melbourne, 1912.

Australia: Its Land, Conditions and Prospects. The Observations and Experiences of the Scottish Agricultural Commission of 1910-11. With numerous Illustrations. Edinburgh: Blackwood and Sons, 1911. *Price* 1*s. net.*

Australia To-Day, 1913. Illustrated. Melbourne, 1913. *Price* 1*s.* 6*d. net.*

Statistics of the State of Tasmania for the Year 1910-11. Hobart, 1911.

Tasmania: The Island State of the Commonwealth. Hobart, 1911.

Handbook of Tasmania: Orcharding, Dairy, Poultry, and General Farming, Information for Immigrants, etc. Hobart, 1912.

Tasmania: Crown Lands Guide, 1912. Hobart, 1912.

Tasmania's Wonderland. Eighty-one Views. Sydney, 1913.

Census of India, 1911. Vol. III., *Assam*; Vol. XXII., *Rajputana-Merwara*; Vol. XV., *United Provinces of Agra and Oudh*. Calcutta, 1912.

The Gold of the Klondike. By J. B. TYRRELL, F.G.S. Ottawa, 1912.

The Pocket Queensland, containing General Information regarding the Great North-Eastern State. Revised Edition. Brisbane, 1912.

The Year Book of Queensland, 1913. Brisbane, 1913.

The Official Year-Book of New South Wales, 1911. Sydney, 1912.

The Britannica Year-Book, 1913: A Survey of the World's Progress since the Completion in 1910 of the Encyclopædia Britannica. Eleventh Edition. Edited by HUGH CHISHOLM, M.A. Oxon. Demy 8vo. Pp. xliii + 1226. London: The Encyclopædia Britannica Company, Ltd., 1913. *Price* 10*s*.

South Australia: Handbook of Information. By V. H. RYAN. Demy 8vo. Pp. 160. Adelaide: R. E. E. Rogers, 1913.

The Year-Book of South Australia, 1912. Demy 8vo. Pp. 192. London, 1913.

Statistical Register of the State of South Australia. Adelaide, 1911.

Catalogue of the Hocken Library, Dunedin, New Zealand. Compiled under instructions from the Hocken Trustees by the Librarian, W. H. TRIMBLE. With a Preface by WM. DOWNIE STEWART. Dunedin, 1912.

Diplomatic and Consular Reports.—Trade, etc. of Shasi, 1912 (5050); Hawaii, 1911-12 (5047); Bahrein Islands (5056); Iquitos, 1912 (5054); Mosul, 1912 (5055); District of Patras, 1912 (5065); District of Colima, 1912 (5064); Cape Verde Islands, 1912 (5063); Kiukiang, 1912 (5062); District of Kuingchow, 1912 (5061); St. Pierre and Miquelon, 1912 (5060); Pakhoi, 1912 (5059); Port of Antwerp, 1912 (5056).

Publishers forwarding books for review will greatly oblige by marking the **price** *in clear figures, especially in the case of foreign books.*

NEW MAPS.

EUROPE.

ORDNANCE SURVEY OF SCOTLAND.—The following publications were issued from 1st to 31st March 1913:—

One-inch Map. Third edition; printed in colours and folded in cover, or flat in sheets. Sheets 84, 94, 102, 103, 109, 110. Price—on paper, 1*s*. 6*d*.; mounted on linen, 2*s*.; mounted in sections, 2*s*. 6*d*. each.

Six-inch and Larger Scale Maps.—Six-inch Maps (Revised). Quarter Sheets, with contours in blue. Price 1*s*. each. *Lanarkshire*.—25 SW.; 36 SW.; 51 SW.

1 : 2500 Scale Maps (Revised), with houses stippled and with areas. Price 3*s*. each. *Lanarkshire*.—Sheets V. 4, 8; VI. 1; VII. 12; IX. 7. *Renfrewshire*.—Sheets II. 11; VIII. 11, 12; XII. 4; XVI. 3, 4; XVII. 5, 6.

Note.—There are no coloured editions of these Sheets, and the unrevised impressions have been withdrawn from sale.

Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 2*s*. 6*d*. each. *Dumbartonshire*.—Sheets XVIII. 10 SW.; XXV. 6 NE.; 7 NE. *Fifeshire*.—Sheets I. 14 SE.; IV. 2 NW., NE.; XX. 9 NW.; XXI. 4 NW.; 14 NW., NE.; XXVI. 12 SW.; XXXIV. 15 NW., NE., SW., SE.; XXXV. 7 NE.; 10 SW.; 16 NE.; XXXVI. 2 NE.; 5

NW., NE., SW., SE. ; XXXIX. 4 NW. ; XL. 7 SW. *Fifeshire and Kinross-shire.*—Sheet XXVI. 12 SE. *Lanarkshire.*—Sheets XLIX. 3 NE., SE. ; 7 NE., SE. ; 8 NW. *Renfrewshire.*—Sheets II. 10 NE. ; VIII. 14 NE., SW., SE. ; XII. 5 NW., NE. ; XIII. 10 NW., NE., SE. ; 11 SW. *Selkirkshire.*—Sheet IV. 13 SE. *Stirlingshire.*—Sheets X. 11 SW., SE. ; 15 SW., SE. ; XXVIII. 9 NW., SW.

The following publications were issued from 1st to 30th April 1913 :—

Six-inch and Larger Scale Maps.—1 : 2500 Scale Maps Revised, with houses stippled and with areas. Price 3s. each. *Lanarkshire.*—Sheets VII. 2, 3, 4, 14 ; IX. 6, 9, 10, 11, 13 ; XI. 6 ; XVI. 3, 4, 8, 12. *Renfrewshire.*—Sheets VIII. (7 and 3), 8, 14 ; XI. 4, 8 ; XII. 2, 3.

Note.—There are no coloured editions of these Sheets, and the unrevised impressions have been withdrawn from sale.

Special Enlargements from 1 : 2500 to 1 : 1250 scale. Prepared for the Land Valuation Department, Inland Revenue. Price 2s. 6d. each. *Renfrewshire.*—Sheets XIII. 6 SW., 10 SW., 11 NW. *Roxburghshire.*—Sheet X. 5 NW. *Selkirkshire.*—Sheet IV. 13 SW. *Stirlingshire.*—Sheets XVIII. 5 NE., SE. ; 13 NW. ; 16 SW. ; XXIX. 7 NW., NE. *Stirlingshire with Dumbartonshire* Det. Sheets XXIX. 7 SW., SE.

GEOLOGICAL SURVEY OF SCOTLAND.—The following publications were issued from 1st to 31st March 1913 :—

One-inch Map. New Series, colour printed ; solid and drift editions. Sheet 64. Price 2s. 6d. net. The Solid is shown in colour. The Drift by symbols in black.

Memoirs of the Geological Survey. The Geology of Upper Strathspey, Gaick, and the Forest of Atholl : Explanation of Sheet 64. By George Barrow, F.G.S., Lionel Hinxman, B.A., F.R.S.E., and E. H. Cunningham Craig, B.A. ; with contributions by H. Kynaston, B.A. Price 2s.

ADMIRALTY CHART, SCOTLAND.—River Forth, Port Edgar to Carron River. Scale 1 : 18,260. New edition, March 1913. Number 114c. Price 4s.

Admiralty Office, London.

EDINBURGH DISTRICT.—Bartholomew's Motoring and Cycling Map. Reduced from Ordnance Survey to scale of 2 miles to an inch. Showing roads and distances. New edition, 1913. Price 1s. Mounted on cloth in case.

John Bartholomew and Co., Edinburgh.

A new edition with improved contour colouring and revised roads.

AFRICA.

CAPE OF GOOD HOPE.—Scale 1 : 250,000, or about 4 miles to an inch. Sheets—Fraserburg, Kenhardt, Schnit Drift, Van Wyk's Vlei. 1913. Price 1s. 6d. net, each sheet.

Geographical Section, General Staff, London.

EAST AFRICA PROTECTORATE.—Scale 1 : 250,000, or about 4 miles to an inch. Sheets—Mumoni (Provisional), Meru (Provisional). 1912. Scale 1 : 125,000, or about 2 miles to an inch. Sheet—Nyeri. 1913. Price 1s. 6d. net, each sheet. *Geographical Section, General Staff, London.*

AMERICA.

ONTARIO.—Topographic Map. Scale 1 : 63,360, or 1 mile to an inch. Sheets —32, Tillsonburg ; 34, Toronto ; 35, Brampton ; 39, Bothwell ; 40, Sarnia ;

42, St. Clair Flats; 43, Ridgetown; 47, Belle River. (Department of Militia and Defence, 1910-12.) Price 2s. net each sheet.

Geographical Section, General Staff, London.

One is glad to see that the publication of this most valuable and beautiful map is now making more rapid progress.

NEW BRUNSWICK.—Scale 1 : 500,000, or about 8 miles to an inch. 1912. J. E. Chalifour, Chief Geographer. *Department of the Interior, Ottawa.*

MANITOBA.—Map showing Disposition of Lands. 1913. Scale 1 : 792,000, or 12½ miles to an inch. J. E. Chalifour, Chief Geographer.

SASKATCHEWAN.—Map showing Disposition of Lands. 1913. Scale 1 : 792,000, or 12½ miles to an inch. J. E. Chalifour, Chief Geographer.

Department of the Interior, Ottawa.

These interesting maps show the extent of lands already settled, also the lands applied for and available for settlers.

MANITOBA, SASKATCHEWAN AND ALBERTA.—Map showing Elevators, for storage of corn, situated on various railways. 1913. Scale 25 miles to an inch.

Department of the Interior, Ottawa.

BARBADOS.—Island of, on scale of 1 inch to a mile—coloured to show parishes. Price 3s. Mounted on cloth in case.

G. W. Bacon and Co., Ltd., London.

PANAMA CANAL.—*Daily Mail* Chart. School edition, with notes for teachers. Price 3s. net. Mounted on cloth.

George Philip and Son, Ltd., London.

This map has already been noticed. The present edition is mounted for school use.

PANAMA CANAL.—Aeronautical View with Statistics.

F. D. Graves, New York.

A somewhat unsuccessful attempt at a pictorial map of the canal.

NEW ATLASES, ETC.

CALENDARIO-ATLANTE DE AGOSTINI.—Anno x., 1913. Con note geografico-statische del Prof. Dr. A. Machetto. Price, lire 1,00.

Istituto Geografico de Agostini, Novara.

The 1913 edition of this neat little atlas contains two new maps and amplified text, with calendar and statistical tables revised to date.

ATLANTE GEOGRAFICO MUTO.—Fisico politico a colori ed albo di esercitazioni cartografiche. G. de Agostini.

Fascicolo Primo—Tavole 17. Price, lire 1,50.

Fascicolo Secondo—Tavole 11. Price, lire, 1,00.

Istituto Geografico de Agostini, Novara.

These maps are beautifully executed and admirably adapted for their purpose.

WIRELESS MAP OF THE WORLD.—Compiled by Marconi's Wireless Telegraph Company, Limited. 1913. Price 2s. 6d. net.

George Philip and Son, Ltd., London.

Shows the "Wireless" Telegraph Stations, existing and projected, all over the world.

THE SCOTTISH GEOGRAPHICAL MAGAZINE.

WANDERINGS OF A NATURALIST IN TIBET AND WESTERN CHINA.

By F. Kingdon Ward, F.R.G.S.[1]

(With Illustrations.)

Burma.—We will pick up the thread of travel at the little village of Bhamo in Upper Burma, one of those outposts of Empire where, in the market, one may jostle with the men of twenty or thirty races, and nearly as many creeds.

It is winter, the dry season in the monsoon area, and through the blur of hot air which blankets the Irrawaddy valley, the distant hills are seen indistinctly; but presently we are trotting down the long white road that leads to China, a road associated with such well-known names as Margary, Baber and Morrison. Soon we are up in the hills, the sound of the torrent floating up faintly from the gorge far below, the deep silence of the forest broken only by the jingle of the mule bells as the caravan swings along at a steady pace, or by the cry of the wild-fowl. There were monkeys to watch by day, and at dusk we listened for the barking deer, or the rustle of the sambur in the marshes. Then out of the dark forest to the bare hills on the threshold of the Yunnan plateau; now we were on the frontier of two Empires; behind us lay the golden land of Burma, before us, stretching its vast plains and mountain ranges far out towards the rising sun, the magic land of China.

Eight stages from Bhamo we reached the city of T'eng-yueh, where I spent ten days, receiving invaluable advice and help from the late consul there, Mr. Archibald Rose.

Yunnan Plateau.—And now onwards we went over the well-forested

[1] An Address delivered before the Royal Scottish Geographical Society, in Edinburgh, on February 14, 1913.

plateau, with abrupt descents into the deep gutters which have scored the face of south-western China from north to south, where flow the Shweli, Salween, and Mekong rivers, crossed by chain suspension bridges which sway from side to side as the mules are led across one at a time. The plateau is already ablaze with crimson rhododendrons and pink camellias; in the thickets lurk strange pheasants of gorgeous plumage, and it is delightful to leave the caravan and wander all day over the wild hills, gun in hand, picking up the road again towards evening.

At the city of Tali, twelve days' journey over the plateau, once the headquarters of Mohammedan power in Western China, another halt is called.

The Yangtse.—From Tali we turn northwards, soon striking the

Fig. 1.—Lake on the Mekong-Yangtse watershed, 16,000 ft.

great Yangtse River at the end of its long southward journey, just as it swings away to the east to flow for over two thousand miles across China. Thus we come to the edge of that marvellous region of parallel rivers which, rising in Tibet and cutting their way due south, are hemmed in between China on the one hand and Upper Burma and Assam on the other, leaving between them towering walls of rock which, covered with the most wonderful alpine flowers, may be called the garden of Asia.

A few days later we turned back westwards, recrossing the Yangtse-Mekong watershed at an altitude of 12,000 feet. On the way over the mountains I left the caravan for an hour in order to shoot pheasants, and lost myself for two days and a night in consequence—an unpleasant experience, for the weather was cold and wet, and I had to subsist on what green leaves I could find; they gave me dreadful indigestion. The only pheasant I saw was late on the second day, when I was too

weary to put up my gun. I shot an innocent little finch instead and ate that.

We now descended to the city of Wei-hsi, situated 8000 feet above sea-level, the last Chinese city we were destined to see for some time.

Numerous Tibetan and Moso traders came in to the markets, and there is a lively bustle about the place. During a three days' rest I made friends with the military mandarin, who sent me a present of bacon and chickens, to which I retaliated with a box of scented soap. Now I began to experience the difficulties of photographing tribesmen, most of whom ran away when I pointed a camera at them; but the Tibetans, reckless fellows, would always stand up to it for the sheer

Fig. 2.—An oasis in the arid region of the Mekong valley, with terraced wheat-fields.

adventure of the thing. On April 25 we continued down to the Mekong.

The Mekong River.—We followed the Mekong northwards for eight days in glorious weather, the valley, at first clad with roses and emerald-green rice fields, and flanked by snow-clad mountains, presently giving place to the barren gorges of the arid regions.

Since leaving Wei-hsi we had been amongst the Moso, a curious folk, whose women are extraordinarily handsome and dress with the most becoming taste, having anticipated their European sisters in the discovery of the box-pleated skirt for instance; but now in the arid region we found only Tibetans. We were now right in the middle of the area where the Salween, Mekong and Yangtse rivers flow for 200 miles within fifty miles of each other. The deep gorges of the Mekong soon grow very dry and lifeless, small scattered villages standing out as oases in the wilderness of rock. The river is quite unnavigable, and is crossed by means of bamboo ropes sloping steeply from one bank

to the other, from which the victim is suspended by leather thongs running on top of the rope. Thus there is a pair of ropes at each crossing, one sloping in either direction.

A-tun-tsi.—A-tun-tsi, which I selected as a base camp for six months' rambling, is a small Chino-Tibetan trading village, through which many of the lama caravans pass on their way to Lhasa. The houses are of mud, two stories high, with flat roofs; in the foreground are the ruins of the monastery destroyed by the Chinese troops in 1905.

The shops and inns are kept by Chinamen; the Tibetans till the slopes, and throughout the brief summer tend their flocks of sheep and yak on the high alpine pastures. Excellent milk and butter can be bought in the village, besides mutton, bacon, chickens, eggs, and barley flour. In addition, the Mohammedans sometimes kill a yak or a cow, so it will readily be understood that the village serves excellently as a base; moreover, rice, sugar, and other luxuries are imported, and though expensive, can generally be obtained. It is advisable to draw the milk into one's own utensils, as otherwise, owing to the dirty condition of Tibetan milk pails, it is miraculously transformed into a sort of sour cream cheese within half an hour; this is not unpalatable, but is limited in its application to cookery. Tibetan butter, too, suffers from being made by the simple expedient of kicking milk about in a skin bag, with the hair inside. However, these are minor details.

The village is 11,500 feet above sea-level, situated on a spur of the Mekong-Yangtse divide, on to which I could step from the roof of my house. The Tibetans I found cheerful and resourceful people to work with; they can stand anything, except soap and water, which they never make the acquaintance of, though this is chiefly a matter of climate. It is better to be dirty than cold, as I found when winter set in.

Journey to the Salween.—And now we will pass on to my first journey from A-tun-tsi westwards over the Mekong-Salween divide to the Lutzu country. It was impossible to get permission from the Chinese authorities to go into Tibet, so I collected men at a quiet village two days' journey distant, and went without.

It rained most of the time, and indeed my guide said it was always raining in the Salween valley. This guide of mine was a most intelligent fellow, who, in addition to Tibetan, spoke Chinese, Lutzu, and other tribal languages; he brightened the journey by pointing out things of interest—plants eaten by the Tibetans, or used as medicines; by collecting jungle produce, including toadstools, bamboo shoots, and fried mice for my supper; and by singing songs. I had also a Tibetan dog to guard my tent at night—a fierce furry animal who became much attached to me. In the night I would sometimes wake suddenly to hear him barking furiously as some denizen of the forest prowled by.

After crossing two passes about 14,000 feet high we had a view of the snow-clad Salween-Irrawaddy divide in the west, and a vast extent of unexplored country spread out in front of us, crossed by Prince Henry of Orleans in the south, and by Captain Bailey in the north. On the tenth day we at last saw the Salween far below us, and descended to a Lutzu village. The Lutzu are a quiet agricultural people, very

friendly, rather good-looking, and nicely dressed; they use the cross-bow with poisoned arrows, and drink vast quantities of a thick soupy liquid made from fermented maize. I was besieged for foreign medicine, and treated half the people in the village for simple maladies, but I did not wait to see the results. The houses consist of a single room, often built on piles, the space underneath being used as a cattle byre: on one occasion we slept fifteen in a room, my own party of nine and the original occupants, not counting various domestic animals.

Next day we crossed the river in dug-outs, and continued up the left bank to T'sam-pu-tong, from where a road is said to strike westwards to Assam. Here the Chinese official requested me to return to A-tun-tsi,

Fig. 3.—Clouds rising up from the Salween valley. The view is taken at the tree-limit, about 13,000 ft.

and gave me two soldiers as escort, but we lost the soldiers next day, and continued up the Salween, the rainy jungle region suddenly giving place to terrific arid gorges.

It was a memorable sight to see that great river smashing its way through the mountains, the endless gorges growing more and more lifeless as we continued northwards. A scorching wind raged through them by day; the glare from the hot pale-coloured rocks grew intolerable; vast screes, sometimes smoking with the dust of falling rocks, rose on either hand; and there was always the booming of the restless river. Then came a voyage in a dug-out, there being fourteen of us on board, squatting on our haunches in single file, besides the dog and luggage. Our gunwale was often awash in the rough water, and I thought we must capsize, but the tribesmen brought us through safely. They had changed a good deal in the last day or two, being now much dirtier.

They never wash, but are eminently hospitable. The children, when they dress at all, wear the skins of goats inside out; but the adults wear hempen dressing-gowns, like the Tibetans.

Finally we got amongst the Tibetans again, and reached Menkong, the capital of Tsa-ring, a few days after Captain Bailey and Mr. Edgar. The former had started for India only three days before our arrival, and of his subsequent remarkable journey to India you have all heard.

The return trip was made over the sacred mountain of Doker-la in appalling weather. When at last we reached the Mekong, we learnt that on the previous day two soldiers had arrived in search of us with orders to bring us back, and as soon as we arrived at A-tun-tsi the official came round to see me in genuine alarm, saying that I might have been killed!

Journey to Batang.—A month later I reaped the whirlwind unconsciously raised by Captain Bailey's exploit, for a whisper sprang up that the English had taken Tibet, an officer having gone in on secret service from China; and I was advised to fly. I heard the news one evening at the end of July, and early next morning we were on the road again, not south to Burma, but northwards along the Tibetan frontier, the journey to Batang, by a great effort, including two days of twelve hours in the saddle, being accomplished in six days. However, at Batang we could hear nothing of the startling rumour which had sent us post-haste to the telegraph office, and after a few days' rest I obtained permission from the official, through the good offices of Mr. Edgar, an English missionary who had accompanied Captain Bailey to Menkong, to travel westwards into Tibet by the Lhasa road, provided I signed a paper absolving the Chinese Government from all responsibility.

Next day we started, voyaging twenty miles down the Yangtse in a light skin coracle, made of three ox-hides sewn together. There were five of us and the luggage on board, and when we stepped ashore the navigator picked up our craft, put it on his head like a gigantic hat, and set off home with it. But if you really want some fun in a Tibetan coracle, you must get a native to take you through bad water when he is thoroughly drunk; he fears nothing then, and if you live to tell the story you will have something to boast about all your life.

The Tibetan Plateau.—We were soon up on the great grassland plateau, where it rains incessantly for six months in the summer, and we reached Gartok without incident, only to learn that the Chinese and Tibetans were fighting further north. We therefore left the Lhasa road, and continued westwards as far as the village of Samba-dhuka.

Never shall I forget that evening after four days of rain and cold on the plateau. It was dusk when we climbed the last spur, and looked away down into a vast trench from which floated up, like a far away song, a murmur of raging water: it was the Mekong thudding southwards through the gorges. The Mekong is undoubtedly the smallest of the three rivers, an exaggerated mountain torrent; yet, when at sunset I saw that streak of light pouring out of the deep sword-cut with which it has gashed the face of south-eastern Tibet, I thought it the grandest river of them all.

At this time I had with me a Tibetan soldier as escort, a most bellicose fellow who wanted to pound everybody with brickbats in his zeal to make them accomplish my will at a word. He nearly got me

FIG. 4.—View on the Tibetan plateau at about 13,000 ft.

into trouble at one village by laying out a man with a rock as big as a football: his zeal outran his discretion, and my patience.

The return to A-tun-tsi was made by a different route over the plateau to Y'a-k'a-lo, where we found more trouble, for the official had been roundly abused by the Viceroy for not stopping Captain Bailey, and the sudden unauthorised advent of another European out of Tibet only added to his concern. However, he allowed me to proceed by the small road on condition that I signed a paper saying that he was not responsible for consequences, which I gladly did, not being able to read

a word of Chinese! There were no consequences except a midnight assault on a Tibetan house in the course of which I was nearly eaten by a large watch-dog, and we reached A-tun-tsi four days later.

Journey to the Yangtse.—Except for a week's journey to the Yangtse and back, *via* the monastery of Tung-chu-ling, September was spent in A-tun-tsi, and the time passed pleasantly enough. We climbed great precipices in search of plants, the nicest of which always select the most abominable situations, and one day in a mist I was pursued by a bull yak, and on another occasion in the forest I found myself face to face with a black bear. Then we had a wedding, and the whole village got gloriously drunk; also a funeral, and they got drunker.

With such a mixed population there was no lack of festivals, which

FIG. 5.—The home of *Meconopsis speciosa*, at a height of 17,000 ft. on the Mekong-Yangtse watershed.

occurred about once a month. They were like a combination of May Day and Guy Fawkes' Day—that is to say, there were flowers and bonfires and noise and things to eat. Tibetan children are keen on dancing, and when their annual picnic came round, the girls danced all the evening in the mule square, playing a game which may be described as a parody on "Here we go gathering nuts and may," though the words, which I did not understand, were probably less ingenuous than in that innocent ditty.

In October we journeyed north-east to the Yangtse, crossing the Run-tsi-la, a pass 18,000 feet above sea-level. This trip was marked by a fine eclipse of the sun, which, however, impressed the Tibetans far less than it did me; they treated it as an almost daily occurrence, though it was dusk at eleven o'clock in the morning.

Journey to the Salween.—When back in A-tun-tsi again at the end of October we heard rumours of the revolution, and the missionaries from Batang passed through on their way south. Living in England, where one gets letters and telegrams several times a day from all over the world, it is difficult to realise the sense of isolation in such a country, where one has no idea of what is going on fifty miles away. I received letters about once in six weeks, but, for the time being, the hustle of the west seemed such a small thing in the world of nature that it had little interest for me. We held a council of war, but nothing could be done while we had no news, and one by one the missionaries left for Burma.

On November 1 our work was finished and we set out for the south, having been warned not to go into Tibet again, though before leaving I presented the official, who throughout had treated me courteously, with a silver-topped glass bottle. Two days south of the village we bribed one of the soldiers to come with us as interpreter, and dashed across the mountains again to the Salween. However, things had to be done hurriedly, in case of official interference, and in the rush, the soldier and the tents got left behind, and we had to go without either.

The weather was better, but the nights in the open forest, with snow falling, were bitterly cold. From the pass, 13,000 feet, a fine view was obtained over the Salween-Irrawaddy divide.

Through the Land of the Crossbow.—On our return to the Mekong we continued southwards to Wei-hsi, and it was now that I congratulated myself on having made friends with the official there; for owing to the disturbed state of the country it seemed a good opportunity to vary the route home by going due south through the tribal country. The caravan, however, would be safer on the main road, and I therefore proposed to part company for the time and meet at T'eng-yueh in three weeks.

The official demurred, saying that the country was unsafe; happily, he had a severe cold, and on my sending him a little medicine, he came round to my point of view; thus I started south down the Mekong valley with two porters, while the mules set out by the main road.

We passed through Lissu, Moso, Minchia, and other tribes, and on the sixth day fell in with the revolutionists. The leader, however, treated me courteously, giving me a special passport, on which it was set forth, to all whom it might concern, that I was to be well treated; and wherever I presented this passport I was courteously received.

The journey was not without incident, however, for one evening I got into trouble with some muleteers, who were about to hit me over the head with benches: however, I calmed them down, and jokingly asked whether they wished to kill me, adding that for the life of one Englishman the Chinese officials would sacrifice all four muleteers! One fellow laughed it off, and added, with true Chinese politeness, that they were not worthy to kill me—a very ambiguous compliment.

Crossing the Mekong we climbed the dividing ridge and so reached the Salween, now finding ourselves amongst the Shans, a people closely akin to the Siamese. Meanwhile the native chiefs of the villages were

very friendly, inviting me in to meals, and taking great interest in my property. An ejector gun was a source of considerable amusement to them, for I often pretended that by whistling I could make the cartridge hop out on to my lap at will—a droll performance that elicited roars of mirth.

On two subsequent occasions I met bodies of tribesmen on the march northwards—fierce-featured men, armed with dâh and crossbow; but I was never molested, and we reached the summit of the Salween-Shweli divide without incident; that night we saw the sun set in a blaze of glory over the golden land of Burma.

T'eng-yueh.—Three days later we were back on the small T'eng-yueh plain, the first piece of flat ground I had seen for six months, only to find that the country was seething, there had been heavy fighting on the main road, and my caravan had not arrived.

However, the consul did everything that was possible, and five days later we received news from the revolutionist leader at Tali saying that my caravan was safe and on its way; it arrived shortly after Christmas, and we at once set out for Burma, getting back to Bhamo just after the New Year.

EXPLORATION IN THE ROCKY MOUNTAINS NORTH OF THE YELLOWHEAD PASS.[1]

By Professor J. Norman Collie.

Up to only a very few years ago little was known about the country that lies along the watershed of the Rocky Mountains in Canada. The first man to cross the continent in what is now Canada was Sir Alexander Mackenzie in 1793. After that date and up to 1857 the only people who visited that "Great Lone Land" were the hunters and trappers, employed by the Hudson Bay or the North West Companies. In 1857 an expedition was sent by the British Government under Captain Palliser to explore the southern portion of the Canadian Rockies and to report if it was possible for a road to be made over the mountains so as to connect Eastern with Western Canada. The report was unfavourable.

In 1871 a survey was started for a trans-continental railway, and in 1886 the Canadian Pacific Railway was opened. This rendered it possible for people to get to the Rockies without difficulty, but still, even ten years later, large portions of the mountainous country, quite near to where the railway passes over the divide at the Kicking Horse Pass, were unknown and unexplored.

During the summers of 1897, 1898, 1900, and 1902 the author explored the country for about one hundred and twenty miles north of the Kicking Horse Pass, discovered many peaks, passes, and glaciers, the most important being a large central snow-field that was the source

[1] An Address delivered before the Society in Edinburgh on February 20, 1913.

of the three largest rivers in Western Canada. It was named the Columbia ice-field : from it flowed the Columbia, the Saskatchewan, and the Athabasca rivers, that drain respectively into the Pacific, the Atlantic, and the Arctic oceans. A map was made of the country thus explored.

But there still remained much more country further north about which practically nothing was known. Dr. Dawson, the late head of the Canadian Survey, wrote only twenty years ago, "In Canada there are 3,470,000 square miles, of which 954,000 square miles (exclusive of the inhospitable Arctic portions) is for all practicable purposes entirely unknown."

It was in 1910 that the first section of the Grand Trunk Pacific Railway was opened almost up to the foothills of the Rockies on the east. This made it possible to reach the Rockies at a point about one hundred miles to the north of the ground explored during 1897-1902, and by following the Athabasca River reach the Yellowhead Pass. This pass leads over the main range from the valley of the Athabasca to that of the Fraser River in British Columbia.

It was in 1910 that the author with Mr. A. L. Mumm made use of the railway ; the railhead was then at Wolf Creek. From there to the Yellowhead Pass was roughly one hundred and fifty miles. With the party came five men together with about twenty horses, the latter carrying all the provisions and tents of the party.

We started on July 17, and on the 27th we crossed the Athabasca, reaching the Yellowhead Pass on the 29th. After crossing the pass we descended about fifteen miles, then struck north up the Moose River, crossed another pass, arriving under Mount Robson on August 9. Mount Robson is the highest measured mountain in the Canadian Rockies (13,700 ft.), and has been known ever since the Yellowhead Pass was first used by white men, for it can be seen from the trail leading down from the Pass to Tête Jaune Cache. It was not till 1907 that it was first visited by Dr. Coleman of Toronto. It has once been climbed—Messrs. Kinney and Phillips reaching the top in 1909.

We intended to remain under Mount Robson for some time, and, if the weather were favourable, climb it. But after waiting eleven days the weather, which had been bad most of the time, became worse, and our whole camp, after a snow-storm lasting two days and two nights, was buried in snow. This finally prevented us even attempting the high peak, but we ascended several smaller mountains. One on the north-west of our camp gave us a good view to the north, into an absolutely unknown and unexplored country. We also went to the head of the great glacier on the east of Mount Robson, but the snow was so deep that we were unable to climb any peak.

As the weather had become too bad for the ascents of high mountains, we determined to work north down the valley of a river, the Smoky, so as to get, if possible, into the country we had seen from the peak we climbed on the north-west of our camp near Mount Robson. The weather, however, continued wretched. We discovered a new pass over the divide well below tree limit at about six thousand one hundred feet. An old

Indian trail crosses this pass, but it had not been used for years. To the north of the pass was a fine snow peak and glacier, and one of our men named it Mount Bess.

It was now time for us to return to civilisation. We had heard from some Indians on the Athabasca that a pass existed somewhere leading from the Smoky River to the Stoney River, and the latter flows ultimately into the Athabasca below Jasper House. Obviously, if we could find this pass, it would be a comparatively short route out of the mountains. But, again, if we went wrong and by mistake crossed a pass to the Sulphur River, it would take us a hundred miles away to the north to the Smoky River again, and it would be two months before we got back to civilisation instead of two weeks.

Fortunately, as it eventually turned out, we found the right pass, but for a week we were uncertain whether we were on the Smoky or the Sulphur River. The following year the same party started back for the Smoky River, our newly discovered trail of the year before being a short cut into the unknown country north of Mount Robson.

This time, as I was collecting material for a map, it was necessary to occasionally climb some mountain sufficiently high to enable me to find out where we were with regard to Mount Robson and the high peaks we had seen to the north of Mount Robson. The first peak climbed was one on the east side of the pass that led from the Stoney River to the Smoky River. From it we had a magnificent view in all directions, including Mount Bess, and to the north of Mount Bess, where a splendid group of snow mountains could be seen. This peak we named Hoodoo Peak, after a bulldog that insisted on climbing the peak with his master, who was one of the men who came with us.

On our way from the pass down to the Smoky River we passed a fine lake. Having reached the Smoky River we crossed it and struck up a valley that came down from the west, for from the top of Mount Hoodoo we had seen a fine snow mountain that lay at the head of this side valley.

At the head of this valley we camped near the foot of a splendid glacier, and underneath several fine snow peaks.

This glacier is probably the biggest and certainly the finest I have seen in the Canadian Rocky Mountains. The glacier that comes from Mount Columbia to the headwaters of the Bush Valley must be of great size, but I have never seen it at close quarters. The glacier under Mount Robson is not so large, nor does it possess ice scenery to compare with this new glacier.

Later we found that it had its source in a large snow-field, and is about two miles wide at the point it issues from the snow-field. It then drops a thousand feet in a magnificent cascade of ice pinnacles. Then there is a nearly flat stretch of a mile and then a second drop occurs. It then narrows and finally ends with a third drop to the floor of the valley. We explored during the next few days the country round the bottom of the glacier. Finally we started for an exploration of the upper part of the glacier and with the intention of climbing a snow peak towards the west. The chief difficulty lay in surmounting the great

upper ice fall. It was impossible to cut a way up it, our only chance lay in climbing up the corner of the ice-fall where it abutted on to the rock precipice on the north side of the glacier. The route was not free from danger, as it was overhung by ice walls that occasionally sent down avalanches. In the early morning we were able to pass this spot safely, and after climbing up some steep snow slopes arrived on the edge of the great snow-field. It stretched for miles to the north-west, and about four miles away to the west at the other side lay the peak we wished to climb. Fortunately it was very easy walking over the névé, and, soon reaching a col on the south side of the peak, we were able to ascend an easy ridge to the top of the peak, 11,300 ft.

From the summit we had a fine view. South-east of us was the highest peak of the group, probably 11,500 ft. high, to the south was Mount Bess, the same height as the peak we were on, and further away we could see Mount Robson and his attendant satellites. To the west lay an unknown land, and our peak fell away steeply for thousands of feet down to a beautiful valley that ran parallel with the main range to the north. Far away to the south-west and beyond the Fraser River we could see the unknown Cariboo Mountains.

It is curious that no one has ever mentioned these excessively fine peaks. They are probably bigger and finer than the Selkirk Mountains, although they do not stretch over so much ground. Two peaks we could see were especially fine, one a snow peak and the other sharper and with more rock on it.

Now, however, that the trans-continental railway, the Grand Trunk Pacific, is going down the Fraser Valley, we shall probably hear a good deal more of this unknown mountain land.

We next attempted to force our way further north along the valley of the Smoky River that runs parallel with the main range. The burnt timber and difficulty of getting our pack horses through soon made us turn back ; and as we had some few days left we determined to visit the country round Mount Bess and if possible climb that mountain. This we were fortunately able to do as the weather was favourable. We ascended from the south side, and found the last two thousand feet very steep, partly ice and partly snow. The top is dome-shaped, and again we had a magnificent view from the summit.

We then made an excursion over to the west side of Mount Bess into British Columbia and were able to see the main range from the western side. And then, as our time was up, we had to turn our backs on this happy hunting-ground and hurry hot foot on the homeward trail. We should soon have to change the camp life for that of the hotel, and our small world was to be ended for the time being. But if one has once wandered in such a land one is always hearing the call to come back again ; the sombre forests, the rushing rivers, the beautiful quiet lakes, and the snow-white mountains, they all call and call again, and the memories of one's old friends on the trail and the free life rise up, and back one has to go to those valleys amongst the mountains and wander once more.

SOME ASPECTS OF GEOGRAPHICAL WORK IN THE SUPPLEMENTARY STAGE.[1]

By T. L. Millar, M.A.

The remarks made, and the whole of the work set out for inspection, emphasised and illustrated the now well-accepted educational idea, that practice lies at the foundation of theory, and that it is by actual doing, and by personal observation, that the child best comprehends geographical problems, and creates his standards of comparison. Below we give a few of the practical methods adopted in Sciennes School, together with a brief description of the instruments used, all of which have been made in the School workshop by pupils between 12 and 14 years of age.

I. To find the Latitude and Longitude of the school.—

Latitude.—The instrument used consists of a pole five feet high, standing on a cross-base. Inserted in the top of the pole is a skeleton quadrant made of three-ply wood. Behind, and projecting to the right of this quadrant, is a small vertical mirror, four inches by three inches, in a frame hinged to a small platform at right angles to the pole, and across the centre of the mirror is drawn a horizontal line to represent the artificial horizon. Screwed to the nose of the quadrant is a thin piece of hard wood with smoked glass on the inside, the whole at right angles to the plane of the quadrant. The sighting-hole in this piece of wood is in the plane of the artificial horizon; while the pointer, a fine banjo-string stretched on a frame resembling the front sighting-vane of a prismatic compass, is screwed to the mirror frame on a line with the artificial horizon. The pupil stands with his back to the sun, and allows the mirror to fall back, thus raising the pointer, until he gets the lower limb of the sun on his artificial horizon. The angle is then read off.

With this must be used the data given on the first two pages for each month in the *Nautical Almanac*—*i.e.*, declination, equation of time, and semi-diameter—and of course wedges and plumb-line for adjusting the pole on sloping ground.

Example—

Altitude of sun at noon (lower limb)	$= 33^\circ\ 10'\ 0''$
Semi-diameter	$16'\ 5''$
$\therefore$ True altitude	$= 33^\circ\ 26'\ 5''$
$\therefore$ Zenith distance	$= 90^\circ - 33^\circ\ 26'\ 5''$
	$= 56^\circ\ 33'\ 55''$
Declination (minus)	$= 34'\ 57''$
$\therefore$ Latitude	$= 55^\circ\ 58'\ 58''$
Actual latitude	$= 55^\circ\ 57'\ 23''$

[1] An Abstract of a paper delivered before the Association of Teachers of Geography in Scotland on February 1, 1913 (see p. 158).

This is the best result the instrument has given, and results have varied between 55° 30′ and 56′ 32″. It forms a good exercise to get the pupil to estimate his error in miles.

1° Lat. at 56° N. = 69·19 mls.
Here error = 1′ 35″ +
∴ Distance too far N. = 1·826 mls.

Longitude.—The watch used must show Greenwich Time. In practice the watch is corrected on day of observation by Castle one o'clock gun.

(*a*) Shortly after 10 a.m. the sun's altitude is observed and the exact time and altitude noted.

(*b*) After the lunch-hour the instrument is set to the morning observation, and the time noted when the sun is again at the same altitude.

(*c*) Division of the sum of these times by 2 gives local noon in Greenwich Mean Time, but, since "apparent time" is wanted, to this result must be added or subtracted the equation of time as indicated in the *Nautical Almanac.*

(*d*) The difference between Greenwich apparent time and 12 o'clock = difference in longitude between Greenwich Meridian and School Meridian in time.

(*e*) Dividing this by 4, as 4″ = 1° Long., we obtain the longitude of the observation station in angular measure.

Example.—Morning observation = 10 hrs. 12 mins.
Afternoon ,, = 14 ,, 4 ,,
24 hrs. 16 mins.
Watch 1 min. fast ∴ 2 ,,
24 hrs. 14 mins.

$$\therefore \text{ Noon "G.M.T."} = \frac{24 \text{ hrs. } 14 \text{ mins.}}{2}$$

= 12 hrs. 7 mins. 0 secs.
Equation of time + = 5 ,, 27·8 ,,
12 hrs. 12 mins. 27·8 secs.
∴ Longitude of school = 12 min. 27·8 secs. W.

$$= \frac{12 \text{ ,, } 27{\cdot}8 \text{ secs.}}{4} \text{ W.}$$

= 3° 7′ W.
Actual longitude = 3° 10′ W.

Again results have varied, being usually slightly higher, and the worst result gave 3° 40′ W. Again the pupils might calculate error in miles and time. 1° Long. at 56° N. = 38·77 miles.

The instrument can also be used to calculate heights by reading elevations at two ends of a measured base line, and then setting out the results to scale on squared paper with ruler and protractor.

Example.—Base line 36 feet 6 inches.
Elevations 34° and 42°.

This gave the height of the school weather-vane as
102 feet + 5 feet for pole = 107 feet.
Actual height from plans = 106 feet.
The instrument might easily be mounted on a tripod, and would then be much more serviceable and portable.

II. The following experiment is used in connection with a graph showing actual and possible hours of sunshine per week at Edinburgh and London—the actual hours data being taken from *The Scotsman* every Saturday. It at once helps the child to appreciate the varying positions of sun and earth relative to each other, and the reason for prolonged hours of summer daylight in high latitudes. Having been shown how to work the experiment, and how to use the *Nautical Almanac*, pupils readily acquire the knack of it, and need practically no supervision.

Experiment.—To find from the globe with the aid of an inch-tape or quadrant the possible hours of sunshine at Edinburgh on March 26, 1912—

(1) When on the observer's meridian the sun's rays reach 90° on a great circle in every direction, . . . = 90° 0′ 0″
N. declination on 26.3.1912, . . . 2° 57′ 35″

92° 57′ 35″

i.e. the rays at noon are 2° 57′ 35″ on the side of the N. pole remote from the sun.
(Note that when declination is S. from September 23 to March 21 the declination must be subtracted.)

(2) Place the tape across meridian 0° at right angles (*i.e.* inch mark coincides with meridian), and with the edge nearer Edinburgh at 92° 57′ 35″—*i.e.* at 87° 2′ 25″ N. lat. on side of globe remote from Edinburgh.

(3) Stretch the tape flat across the globe and calculate along latitude of Edinburgh, 56° N., the number of degrees of longitude E. and W. of meridian 0°, intercepted between that meridian and edge of tape touching 92° 57′ 35″—in this case
95° E. + 95° W., = 190° long.

(4) Divide by 15 to obtain hours $= \frac{190}{15} = 12$ hrs. 40 mins.

(5) From *Murray's Time-Table* :
Sun rose 5 hrs. 57 min. a.m.
Sun set 6 hrs. 40 min. p.m.
∴ hours of sunshine = 12 hrs. 43 min.
∴ error = 3 min.

In this experiment a small allowance ought to be made for refraction, and more frequently than not by adding some 8 mins. to his result the pupil gets an absolutely correct answer.

III. *Contours.*—The following model was devised to explain how

contours are laid down on Ordnance Survey Maps, and shows steep and gentle slopes, a valley, a section, and is of course used to elucidate the interpretation of such contours generally. From the use of the instrument described above a pupil readily appreciates how heights are estimated, and that contour lines join points at the same altitude above "Ordnance Datum."

The large model consists of two blackboards hinged together, and painted on the lower board are lines to represent the vertical and horizontal scales of a section. Let in along the centre of the upper board is a detachable section through the two hills with steep and gentle slopes and a valley between. In front, behind, and down the middle of these sections run vertical rails, on which are built up the eight, inch-thick, horizontal sections of the hills while the boards are horizontal. The pupil outlines the lowest contours, withdraws the lowest horizontal sections, and the whole model slides down the rails, and of course falls within the drawn contours. The other contours are treated similarly until the whole model has been contoured.

The centre section-board is then removed and the boards hung vertically to exhibit the contours. The line of insertion of the centre-board shows a line of section, and from points of intersection perpendiculars are dropped on to the scale on the lower board. The ends of these are then joined, and by laying the centre-board against the drawing the pupil soon grasps the significance of such a section and what it really shows.

IV. *Synoptic Charts.*—In connection with the study of "Synoptic Charts" a record of daily weather observations is kept by each pupil. To sustain interest in these observations a weather-pole has been constructed on which are shown, in coloured flags made by the girls, the main weather observations over a month.

This is a sixteen-sided column, 5 feet high, with 31 holes down each face, and standing on a cross-base on which are painted in various colours the cardinal points. Inserted in the top of the column is a rectangular frame, 19 inches × 10 inches, carrying three vertical columns on which can be read by means of sliding pointers the rainfall for the month to hundredths of an inch. Round this frame and in its edge are bored 31 holes with dates opposite for the insertion of brown or white flags to mark days of rain or snow respectively, while the strength and nature of the wind for the day are shown on grey-coloured flags with words printed across them, inserted in the upper corners of the frame. The scheme of flag-colour was chosen thus:—

N. *Red*—cold winds, red noses, often red skies towards evening.

S. *Yellow*—sun moves round by south.

E. *Black*—cold, raw, uncomfortable, dirty weather in Edinburgh.

W. *Blue*—the region of clearing showers—blue sky.

Intermediate flags are of various colours, *e.g.* SW. = upper half *yellow*: lower half *blue*. ENE. = $\frac{1}{3}$ *black*: middle $\frac{1}{3}$ *red*: lower $\frac{1}{3}$ *black*. At the end of the month the results are set out in graphic form and in colour, corresponding to the flags, *e.g.* the "wind-star" pointers converge towards the centre of a large circle, and show to scale for any day the direction, strength and nature of the wind. From these graphs the lessons of the month are

deduced and examined in the light of the "Synoptic Charts," and the necessary explanations of high and low pressures and atmospheric physics are given.

Excursions.—During the spring and summer months a series of geographical excursions are organised on the principle that the same ground is covered twice.

(*a*) In the first attention is given to phenomena relating to physical geography, and with this is associated such historical and economic connections as may arise en route.

(*b*) During the second ramble plant geography only is taken, special attention being given to climatic and edaphic factors, and in this connection a chart of life histories, with illustrative specimens of the common district trees, is filled in throughout the year.

On these rambles survey maps are carried, and heights such as Arthur's Seat are calculated by boiling water at the "Bench-Mark" nearest the base and at the summit, and by pocket aneroid. When on the top (a whole day excursion) a shadow stick is erected and read every fifteen minutes, and the results graphed later give a good basis for the interpretation of longitude. Here also a lesson is given on how to find direction—

(*a*) By compass.
(*b*) By watch.
(*c*) By shortest shadow.

Having nailed direction tapes across the summit the pupils erect a table and construct a "Direction Chart" by drawing rays from the origin (Edinburgh) of N. and S., and E. and W. co-ordinates, to towns, hills, islands, etc., in view on both sides of and in the Firth of Forth. Direct distances are taken from large scale maps. These distances are then compared with rail and road distances, and the chart is made the basis of many valuable lessons on how Nature aids or impedes man's movements, and how man circumvents natural obstacles.

THE SPECIFIC CHARACTERISTICS AND COMPLEX CHARACTER OF THE SUBJECT-MATTER OF HUMAN GEOGRAPHY.

By Professor Jean Brunhes (translated by E. S. Bates).

(*Continued from p.* 322.)

III.—The Complex Character of the Subject-Matter of Human Geography.

There exist, then, facts which have affinity with Politics, with History, with Art, Linguistic Science, Ethnography, Political Economy, and yet belong to none of these studies. These are the facts whose specific character we have just defined, and which ought to be the primary objects of study among anthropo-geographers. But these, using as they

must subject-matter of this description, are obliged—as Bosnia-Herzegovina has just shown to us—to take into account more complex entities, entities which are both tremendous and yet elusive: but facts which are strictly geographical in nature, realities of the most practical kind, lead us on to the study of these. In proportion as they do so, we must study such facts.

(1) *Each Fact of Human Geography contains and implies a Social Problem.*

Let us bear in mind, in point of fact, that when geographers wish to show the connection between particular instances and general ideas, they should not merely draw upon the results of ethnography, or history, or statistics; they must go further. I maintain that the ultimate analysis of any fact of Human Geography reveals a problem which is not only an economic problem, but a social one too. If we ascertain the numbers of a drove of horses or of camels, if we go down a copper- or a coal-mine, if we examine the yield of a Fang hunt or the Bergen fish-market, we cannot prevent deductions relating to social states ensuing from our observations or our analysis. It is never a case of mere juxtaposition of the respective facts: the deductions are part and parcel of the whole material reality to such an extent that it is an impossibility to get to the bottom of the reality without perceiving the social fact which is part and parcel of it too.

Show me your plough, and how you drive your furrow, and I will tell you whether your share, which barely breaks up the surface, is that of a nomad shepherd whose main source of livelihood is his flock, and who comes in haste, almost by stealth, to sow where he will come again only to reap: or whether that wooden share, whose furrow is also no deep one (as well may be the case since the mud it cleaves is so impregnated with salts that it is risky to trench too deeply if plenty of water is not available wherewith to irrigate freely enough to dissolve the salts), belongs to an Egyptian *fellah* and co-exists with a given type of irrigation-methods. I will tell you whether you are a peasant from these fields of ours that have been cornfields time out of mind, from the districts of Beauce and Brie: where the character of the furrows, a tradition in themselves which dates back hundreds of years, at once reveals individual ownership, whether on a small or large scale, and also one of the most persistent and most perfect forms of conquest by culture. Or, at sight of the plough, I can say if you are engaged in trenching chiefly rich earth, in order to sink the beetroots with which the syndicate owning the neighbouring sugar factory provides you, sugar-producing plants which are all bought and sold in advance: I will tell you, finally, when you show me the row of ploughs—a whole battery adapted to steam or electric force—which are simultaneously at work beside your seed-drills—that you belong to a region where labourers are few, or almost unobtainable, for you must belong either to the vast tracts where the New World practises its rapid and highly specialised methods of culture, or else to the Old World's model farms.

The inhabitants of Utah and Colorado are identical in nature,

Mormons mainly (one of the most zealous apostles of "dry farming," Widtsoe, hails from Utah), but there is a wide difference between the two States as regards cultivation, Colorado being by far the more prosperous, for the reason that the land has been distributed there with greater discretion. Between the two States exists the same difference as between Tunis and Algeria. In Colorado land has not been allotted, as a matter of local politics, to people who frequently lack the requisite physical strength. The authorities waited until candidates presented themselves who were possessed of sufficient will-power, incentive, and means to tackle virgin soil effectually.

Our essential facts, then, separately or collectively, are concrete illustrations of a series of social facts. In the course of every immigration or emigration movement how varied must be the social phenomena implied, in the old home, and in the new! Some day or other I shall certainly endeavour to show you how the truly geographical factors in ethnographical problems come to light, in Human Geography, as kinds of social problems.

(2) *Every Fact of Human Geography necessitates and implies a Statistical Problem.*

A fact of Human Geography, however interesting it may be, has not become known to us in the fulness of its import as a scientific discovery until we have recognised and can appreciate its coefficient in statistical values.

How many travellers and observers exaggerate the importance of some isolated fact and thereby falsify their glimpse of reality. They base their idea of a race on careful measurements and photographs of a single individual; they represent a whole nation as hospitable because they were well treated in a particular place by some few of its inhabitants; or, on the other hand, they vilify some other whole nation because an unfortunate mood of their own, or some failure in tactfulness, has occasioned one unpleasant experience. These things are examples of the moral order, but they afford us some insight into the number of errors which can accumulate behind the magic veil of an unquestionably authentic photograph or of first-hand observation of persons or of places.

It cannot be repeated too often that the concern of Geography is with the normal, not the abnormal; not with the weight of the exceptional ear of wheat, but with the yield of bushels per acre; not with the extraordinary specimen of a mineral, but with average percentage. "Normal yield," "average value"—do not these imply a sober and rational statistical estimate of facts noted one by one, such as will attribute to each its due importance as a factor in relation to a just calculation of the generalities of the subject. In exact proportion to the worth of the data and of the methods of statistical calculations will be the worth of the inferences drawn.[1]

[1] I may use as a reference pp. 623 *et seq.* of the 2nd ed. of my *Géographie Humaine*, Paris, 1912.

But while conceding this much as regards statistical valuations whose real values we sometimes find to be not quite great enough, we are bound to recognise that Human Geography ought always to retain the assistance of this most useful auxiliary. The point of view of the detailed, meticulous monograph and that of the generalising epitome may often seem to be irreconcilable: but each acts as a check on the other. Nevertheless, let us not go away with the idea that this discordance is only an imaginary one. While we must, and ought to, pass from the one to the other, and while any conception is incomplete which fails to co-ordinate the two, they are nevertheless so alien to one another, so sharply contrasted, that a great deal of knowledge, and a great deal of faith, are required before we can get accustomed to the transition from either perspective to the other.

That master whom we all regret, who taught Economic Geography at the Collége de France over so long a period, and who has left us the memory and the high example of a lifetime of unwearied toil and strict integrity, may be cited as witness to this: he has delivered to us the theory underlying these connecting links between geography and statistics, subtle and complex though they be. In the opening lecture of his course, on the history of economic and social achievements, M. Marion ably summarised Levasseur's work. Allow the occupant of the chair of Human Geography likewise to utter his ready and heartfelt homage to him who, throughout his life, right on to the final days of his vigorous old age, remained geographer, historian, and statistician.

One fine attribute of Emile Levasseur's was that of retaining that feeling for living realities with which he began his studies: he never slackened in his vigilance in verifying average and abstract values by confronting them with the practical facts of the terrestrial surface. In his very remarkable *Introduction sur la Statistique*, which forms the preface to his work on the population of France, he wrote:—"Statistics supply figures which labour under the defect of being abstractions." But these abstractions correspond to realities of such a kind that we cannot be prevented from treating them almost on a footing with facts. The averages of births, deaths, marriages, etc., the average yields per acre of wheat or rye, or barley, etc., harvests over a given area, have both in their variations, and in spite of their variations, so much continuity that we end by being struck chiefly by the universality, and even, in a measure, by the inevitability, of the causes which seem to govern human societies and activities: and the temptation arises to ignore causes which are accidental, local, or special, which throw light on genuine characteristics of groups of individuals, or of this and that individual, just as the same temptation arises with reference to the reasons which vary the conditions of production in this or that field, and in this or that district, despite proximity. We are fascinated by that somewhat super-real harmony which figures set before us, and then we grow less appreciative of the analytic detail which is so specially valuable a product of studies such as history and geography. The difficulty was recognised by Levasseur: probably it is recognised by everybody who passes from first-hand observation of details to generalised

estimates based on summaries. Is it not a fact that the general laws which govern the modalities and caprices of individuals are so rigid as to lessen the interest which ought to be a factor in inquiry into those unsophisticated expedients hazarded by individuals and by localities? Does not the curve sometimes seem unable to bend? Does not the practice of (mathematical) interpolation suggest a sort of implied protest against the "infinite variety" of geography? But that is what statistics are for—to legitimise this plan of interpolation, and to underline that seeming, or at any rate relative, inflexibility of curves.

On the other hand, have not the most regular of curves been diverted, or even shattered, by well concerted geographical conditions, just as much so as by the strength of will of certain individuals in history? We must therefore learn how to combine the use of statistics with inquiry into the evolutionary processes with which history acquaints us, and also with a critical and comparative study of all the variety of combinations existing in space. This trinity of entities delimited the whole of Levasseur's learned labours, whose aim was to define the interrelations of these subjects, so vast in their scope, sometimes at war with each other, and sometimes co-operating. He knew how to modify the calculations of statistics by means of historical research and geographical investigations. And note that this geographer-statistician of the population of France has been a hard fighter on behalf of reform in the teaching of geography, and also the historian of the working classes; the issue of the second volume of his splendid *Histoire du Commerce de la France*, the posthumous volume for which we are indebted to the loyal efforts of Auguste Deschamps, occurs very aptly to illustrate what I say. Levasseur's clear insight and enlightened common-sense enabled him to find common ground for these irreconcilables. Therein lies the profound and illuminative significance of his varied and complex labours; it has ensured its merit and will ensure its durability.

In short, statistics serve a purpose; in their own way they organise and group, using words to explain numbers and numbers to elucidate ideas, and both in reference to those same modes and realities of dynamic energy which come within the scope of scientific vision once again, albeit from another angle, both in history and in geography. But in so far as our "essential facts" of the terrestrial surface are concerned, what are statistics, what can they be, without Human Geography, which both creates and modifies them?

We shall have to put our trust in tact and use the utmost discretion in estimating the relative values of the facts (necessarily few in number), which we have seen with our own eyes, for the purpose of these generalising calculations which, when considered simply in themselves, so often prove misleading. The truth will be ascertainable only by means of comparison; and even then no geometrical truth will ensue, but merely what is relatively true, whose value will be the joint product of the value of the observations and of the degree of critical faculty employed in determining the compromise between the things seen and arithmetical deductions, whether totals or averages. I do not hesitate to state definitely that every truth concerning the relations between natural sur-

roundings and human activities can never be anything but approximate : to represent it as something more exact than that is to falsify it, is to become anti-scientific in the highest degree. For this reason I shall demonstrate later how radically vitiated have been those systems which have exaggerated man's dependence on his surroundings, and which have represented the evolution of history and of civilisation as a matter which logic might have prophesied.

Speaking of the truth of a fact is a curious instance of the misuse of words. A fact possesses dimensions, colour, duration : but it does not possess truth : it is in our perception of the fact that truth or falsehood lies ; it is the criticism that we pass on it that possesses more or less accuracy. Science consists of nothing but the relations we establish between facts. Now all scientific truth is inherently similar, in fact more or less identical, with what we have just been terming a truth of Human Geography. And therefore let us avoid demanding of statistics, as do so many superficial minds, the illusion of pseudo-arithmetical precision (which would imply the illusion of a pseudo precision of deduction), but simply ask for a just estimate of objective truth—assuredly a very real thing—the basis whereof we shall recognise, implicitly or explicitly, to be an estimate of probabilities.

One of the most remarkable mathematicians in this country and of our age, Émile Borel, has written several articles which deserve geographers' special attention : "Le calcul des probabilités et la méthode des majorités "[1] ; "Le calcul des probabilités et la mentalité individualiste "[2] : "Un paradoxe économique, le sophisme du tas de blé et les vérités statistiques."[3] Once statisticians cease to rest content with making computations, once they endeavour to predict, they formulate truths which acquire a peculiar, but none the less real, value from the fact of their being based on the theory of probabilities.

"The idea which I am trying to isolate," says Émile Borel, "is this, that the answer for a mathematician to give to many a practical question consists of a coefficient of probability. Such an answer will seem unsatisfactory to many persons, who expect mathematics to yield certainties : a very lamentable tendency. It is most unfortunate that the education of the public should be, from that point of view, so very backward. It is doubtless the result of the computation of probabilities being so almost universally ignored, in spite of the process entering with ever increasing frequency into everybody's life (in the shape of the various forms of insurance, friendly societies, pensions, etc.). A coefficient of probability constitutes a perfectly clear answer, which is in accordance with a perfectly tangible reality. Some people will affirm that they 'prefer' certainties : perhaps they would also 'prefer' that 2 and 2 should make 5.

"If the conception of statistical truth came to be familiar to all who write or speak on questions wherein statistical truth is the only kind of truth available, many sophisms and many paradoxes would be avoided."[4]

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[1] *L'Année Psychologique*, xiv. 1908, pp. 125-151.

[2] *La Revue du Mois*, vi. 1908, pp. 641-650.

[3] *La Revue du Mois*, iv. 1907, pp. 688-699.

[4] "Un paradoxe économique," article quoted, p. 698.

He goes on to say: "Many persons, acute enough in other ways, imagine that there are no truths except those particular truths to which they give the name of facts. As I came off the boat at Dover I noticed three Englishmen, each of whom was over six feet high; that is a fact; but it is a fact which does not possess any importance; whereas the proposition that Englishmen's average height is less than six feet is not a statement of fact, but an average struck from a multitude of facts; yet it is a genuine scientific truth for all that."

In another article Émile Borel writes further: "The development of modern physical theories renders it clearer every day that the idea, which Maxwell was the first to foreshadow, namely, that most, if not all, physical laws are truths of statistics, is a true one; in other words, they embody a net result in relation to phenomena which are too numerous and too complex for detailed analysis of them to be practicable. If these statistical laws are more definite than the laws of demographical statistics, it is merely because the number of entities concerned (molecules or electrons) cannot be compared with the number of human individuals, and we know that the accuracy of a statistical estimate is roughly in proportion to the square root of the number of its constituent entities. Thus a statistician can foretell how many births will occur in Paris next week to within 10 per cent. or thereabouts, whereas a physicist, on being given a cubic measurement, a temperature, and a pressure, will know the corresponding content of gas to within 1 or ·01 per cent. . . ." And, after expressing a well-founded regret at the persistence with which criticism is directed, in the name of absolute truth, against many a method or institution which cannot lay claim to anything more than "statistical truth," M. Borel concludes: "The social sciences, using the term in the widest sense, often submit to the use of statisticians' methods in the absence of any other available methods, and they prove so serviceable as to leave no room for lamentation at the frequent failure to discover some more scientific method. And this is true not only in relation to the innumerable questions where social procedure is at stake, but also in sciences which are more exclusively intellectual and less immediately practical, such as philology, linguistic science, the history of art, or of literature, etc." [1] To these we may add Human Geography.

All biological relations, all œcological truths, are, and can be, nothing more than statistical truths. An example taken from botany, a recollection of the mountains of that splendid and hospitable country associated in my mind with sixteen years of work and Alpine excursions, may serve to make clear how far an approximate truth is a truth, what kind of a truth it is, and how a readiness to over-define its applicability tends to subvert its nature. As you climb higher on the slopes of the Alps you find changes taking place in the flora. And the most ordinary, the most significant, the most clearly marked of the characteristics of the flora of higher altitudes may be summed up as follows:—(1) diminution of the organs exposed to the air, so much so that in many cases dwarf

[1] "La théorie des probabilités et l'éducation" (in *Hommage à Louis Olivier*, Paris, 1911, pp. 37-40).

types appear: (2) subterranean organs, roots and root-stocks, proportionately more highly developed: (3) various arrangements tending to retard transpiration and to minimise the risks run by the plant in connection with that part of it which is exposed to the air, whether through frost, or nocturnal radiation, or too great heat by day (villosity, carnosity, increased thickness of the epidermis, narrower diameter of the cells, greater power of osmotic attraction in the cellular fluid); (4) flowers which shoot up to a greater height and display a more intense and deeper colour. It is when our eyes are held by the velvet-like colouring of the gentians of the higher altitudes, that penetrating, full-toned, vivid blue, that the fulness of the truth about these transformations of vegetation dawns upon us. But have we here a series of transformations which obey a uniform, rigid law? Certainly not. As we go higher, the vegetation is seen to be undergoing alteration little by little, without sudden and thoroughgoing transitions: there exists no boundaries at which these phenomena begin or end. Yet no less certain is it that these strange and fitful modifications, when considered as a whole, constitute one of the most striking cases of a transformation-scene in Nature that could be discovered. Here we find a statistical truth in connection with the physiology and the geography of vegetation which exactly corresponds with what we term truths of Human Geography when we are considering connecting links.

(3) *Every fact of Human Geography conceals and implies a Psychological Problem.*

With these principles clearly before us, we shall go on collecting truths of Human Geography and the harvest will be a great one. And the outcome of it all will be nothing less than light thrown on the most puzzling and unfathomable of problems, that which is dimly outlined where even imagination fails to admit us, in the background which is common to history and prehistory and ethnology and sociology: namely, the problem of the conditions of the successive implantation of humanity on this earth and of the part that humanity has played in the transformation of the planet: the earliest forms of tillage, of alloys, of industry, of townships. But we shall be aware just how much truth these truths contain: we shall not be credulous, we shall not be dupes: for nothing within these limits is absolute or stable. All connecting links between human activities and Nature (and, consequently, all facts of Human Geography, being, as they must be, effects and symbols of those connecting links) are dependent upon that factor which is ever at work, whether at the bidding of free-will or of fate,—the human being.

For the purposes of objective study we have, in *La Géographie Humaine*, presupposed that we have risen above the earth's surface as if in a balloon, endeavouring to discern and to classify all "visible and photographicable" facts which are due to humanity's existence thereon. But as soon as we have landed and have followed up our elementary efforts at first-hand observation and definite classification by a practical

recognition of our duty to go on to an analysis of causation, everything combines to make us aware that the facts of Human Geography derive their primary specific characteristics—I do not say their predominant characteristics, nor their essential features—from a fact of human life evolved either from the physiological necessities of our bodies, or from our desires, or from our concepts, or just from our ephemeral illusions.

Let me remind you of some well-known facts—too well known, and chosen because they are so. Tea and coffee only possess their economic value because we like them: we like them because they have been brought to our notice, and because we have become convinced that they are good to drink. The original and the abiding geographical causes of the cultivation of tea and of coffee on a large scale are within ourselves.

So far as Man is concerned coal was non-existent until he came to understand it: in other words, until he became aware that this black rock, unlike basalts and black sandstone, would burn and formed an incomparable source of latent energy. From that time onward he has been the industrial slave of the coalfield: has built factories, or transferred them, near the mouths of the pits; but, here too, if coal is his master, it is he himself who has made it so. If it lies with the coal supply to create or to withhold certain modes of his activities, the initiative was his by virtue of his knowing how to use it and, so to speak, domesticate it; and determining to do so.

As with these elementary facts, so too with the greatest and most complex facts of political geography; conquering a country implies becoming more dependent on it; but this result is a result of conquest.[1] Let us try and identify the human "points of departure," whence radiates all the bio-geography of man.

To begin with, there are those fundamental physiological needs which have received detailed treatment in *La Géographie Humaine*: the need for food, with all that pertains thereto; the need to drink, the curious physiological desire for salt, etc.; the need to sleep, which begets the need to erect a shelter, a house; the need for protection against changes, sudden or extreme, of temperature, which brings in its train a need for clothing. And the exigencies of these elementary needs grow ever more and more manifold and insistent; their iron rule is responsible for the creation and for the continually increasing development of the major part of terrestrial economics.

We have been told how different geographical horizons exist for different groups of human beings, and that these horizons expand in proportion as each group becomes more civilised and more effective; "Räumliche Anschauung, enge oder weite Horizonte."[2] We might well speak of an horizon of free choice for each little group. When a peasant

[1] It is in this sense that we must interpret Marcel Dubois' bold assertion: "Nature promises nothing: everything must be wrested from her by means of work and knowledge" (*La crise maritime*, p. 21).

[2] Cf. Fr. Ratzel, *Anthropogeographie*. I. Theil, 3 Aufl., Stuttgart, 1909, pp. 148 *et seqq.*: II. Theil, 2 Aufl., Stuttgart, 1912, pp. 29 *et seqq.*

decides on a site for his house, he considers the most favourable situation in relation to sun, wind, and water; but the limits within which he may choose are usually very narrow: his horizon of free choice is close around him. Now when the earliest settlers were seeking settlements among the chalky plateaux of Normandy, they found better shelter from the wind, more springs, greater proximity to the sea, whence came their food, in the "valleuses"; everywhere, therefore, we find the villages established in these hollows. This neglect of the shelterless higher ground in favour of the little *thalwegs* abutting on a stretch of sand implies some more or less conscious survey of the whole of a district which is of considerable extent; and we cannot do otherwise than assume so systematic a crystallisation of humanity to be the work of men whose horizon of free choice was likewise of considerable extent. In so far as the origin of a given town was due to a founder—whether overlord, bishop, or conqueror—who intended to be a founder, so far has its site been selected for it by virtue of a comparison of sites ranging over what is a territory in the fullest sense of the word. The farther history advances, and the higher the degree of perfection attained by human groups in the way of culture, so much the nearer does our horizon of free choice approximate to the farthest limits of habitable land: all progress in means of communication creates its equivalent in greater freedom of choice for each group, and often, indeed, for single individuals: a twofold choice, not only where to live, but also what to do. When the archduke Ludwig Salvator had finally satisfied his peripatetic instincts and his observant eye by journeyings along most of the coastline of the Mediterranean, he took up his abode halfway up the glorious slopes on the north-east side of Majorca, and there founded the Miramar of the Balearic islands. And a whole State, the Commonwealth of Australia, undertakes a prolonged comparative inquiry for the purpose of deciding on the site of its future capital, and institutes a competition between the architects of two continents concerning the planning of the city that is to be. The real advantage that a certain number of Anglo-Saxons have secured in practical life is doubtless due to their having taken into account this horizon of free choice, which is the gift of modern civilisation and of their having tested the benefits of the variety of the opportunities it offers more thoroughly than others have done.

The outstanding psychological fact, then, is the antithesis of a rigid fatalistic determination of human acts by climate and by soil. It is this —that natural surroundings, whether as a whole or in detail, react on us just so far, and just in such a way, as we adopt them: in other words, according to our interpretation of them.

A river, a mountain, forms a frontier only in so far as we form such and such ideas, economic or political, concerning frontiers; ideas which undergo modification in the course of history. Mont Blanc, for instance, is a supreme example of a majestic and decisive boundary to those to whom the idea of watersheds represents an abiding truth; yet, not only is that idea less than two centuries old, but at this very moment Mont Blanc and its setting are in reality so far from constituting a boundary that one and the same language, French, maintains its hold in every

valley on every side of it, just as firmly in the valley of Aosta, which belongs to Italy, as in the Swiss Bas Valais and the valleys of Savoy. The fact is that the two routes of the Great and the Little St. Bernard have remained so much used and so important as to uphold the natural unity of that great entity in spite of all the claims and chances of politics.

In Nature there exist no frontiers but those of our theories. Instead of pursuing the mirage of a classification which distinguishes between natural and artificial frontiers, instead of succumbing to the temptation to bemuse ourselves with the still more factitious distinctions between "Naturgrenzen und natürliche Grenzen," let us keep this clearly in mind, that time and place have caused the same features of Nature both to be, and to cease to be, boundaries: *frontier antinomies.*

Among islands which are on the same footing as regards physical and climatic conditions, some are over-populated, like Java, while others, such as Sumatra and Borneo, are more or less uninhabited: *insular antinomies.*

Places seemingly predestined to be the sites of great capitals have been abandoned, whereas Pekin and Madrid have come into being on barren wilds: *urban antinomies.*

Confronted with the manifold, but clearly defined, possibilities, which every district and every homestead lay before us, men are bound, as P. Vidal de la Blache has phrased it, to take sides. And, seeing that their achievements on the surface of the globe tend to transform the original conditions of their natural surroundings in ways that, though imperceptible, are nevertheless unceasing, we need not be surprised at what seems to be contradictory in historical and geographical life. They suddenly take it into their heads to give effect to some side or other of reality which they had been ignoring. The Portuguese turned themselves into sailors at the shortest notice, once America had been discovered. The Dutchmen who had been sailors and town-dwellers and accustomed to co-operation on a grand scale, became shepherds and individualists as soon as their natural surroundings were changed. And when the Highlanders of Scotland were hunted from the agricultural holdings, which their inhuman masters ravaged with fire, they took refuge by the waterside and became fishermen: *racial and social antinomies.*

What splendid suggestions for study are these! Just think of the new fields of research they open up for us!

Thence too, we geographers may infer how to visualise the vicissitudes, both great and small, of economic history. The damp and flinty lands at the heart of the district of Léon in Brittany once produced nothing but mediocre cereals: to-day, thanks to the pastoral industry, it has become a land of beautiful green meadows. In the Vannetais and Cornouaille the railway has led to apples being grown for cider, apples which are utilised by a Würtemburg factory more than 1000 kilometres away.[1] And the same method in observing and meditating

[1] Cf. H. Hauser, "La géographie humaine et l'histoire économique" (*La Revue du Mois*, i. 1906, p. 209).

will assuredly enable us to perceive the minutest, but equally real, contradictions, such as those to which our attention has been drawn by A. Demangeon (in relation to dwellings)[1] and by R. Blanchard (in relation to tillage).[2]

In two weighty articles which M. P. Vidal de la Blache has published in the *Annales de Géographie* he has thrown much light on the theory and on the consequences of what he terms "genres de vie."[3] We may summarise his argument as follows:—

The life of a district, as we see it to-day, is divided up in such a way that differing modes of life co-exist quite separately, albeit side by side. If a highly perfected agricultural civilisation has clearly gained the upper hand in that vast oasis of the Nile which we know as Egypt, "the victory of agriculture is, nevertheless, not immune from reaction and checks. Twenty or thirty kilometres from the sea, where occurs the classic delta of the Nile, the gradient decreases almost to non-existence, thereby hindering the outflow, a consequence of which is that the salts are brought to the surface by capillarity, thus forming the salt marshes which are a continuation of the desert."[4] Within this region the lagoon fishermen and the nomad Bedouin replace the fellah. So too round the marshes near Kerbela into which what used to be the western branch of the Euphrates now disappears, thanks to men's negligence. All the vicissitudes that characterise the life of the river thus find their reflection in the modes of human life. A vivid epitome of this affinity between the degradation of modes of existence and the pathological phases of water-courses in arid wastes is given by Sven Hedin.[5] On passing away from the great oases of Yarkand and Kashgar we find but a scanty population of shepherds among the groves of willows and poplars which fringe the Tarim as it wends its way amidst the sand, only to vanish utterly in the end in immense jungles of reeds, in the intervals between which a few tribes derive a bare existence from fishing. The same story would apply, almost word for word, to the Shari during its course towards Lake Chad.

Moreover, in the same territory, or even in a territory which possesses some sort of unity, either physical or political, kinds of occupation which are akin to "modes of life," but which are wholly distinct from one another, are not only to be found existing in alternation, but are harmonised and supplement each other. Thus when the shepherds lead their flocks to graze in the stubble on the great corn-plains of the Beauce, the pastoral industry is found in intimate relation with agriculture. In all the sheep-rearing district, indeed, an organic relation between the pastoral and agricultural industries exists. Far as we are

[1] "La Montagne en Limousin: Étude de géographie humaine" (*Annales de Géographie*, xx. 1911. p. 329).

[2] "L'habitation en Queyras" (*La Géographie*, xxii. 1910. p. 324).

[3] "Les genres de vie dans la géographie humaine" (*Annales de Géographie*, xx. 1911, pp. 193-212, 289-304).

[4] Jean Brunhes, *L'irrigation*, Paris, 1902, pp. 324 *et seqq.*

[5] *Scientific Results of a Journey in Central Asia*, 1899-1902. Vol. II. *Lop-Nor*. Stockholm, London and Leipzig, 1905, pp. 609 *et seqq.*, with map, pl. 63.

from the over-simplified classifications of certain schools of sociologists (vanishing now, it is hoped) which told men off into irreducible categories, shepherds, agriculturists, fishermen, hunters, etc., it is nevertheless clear that groups do exist which have had, and have still, but one form of occupation: but yet, as geographical evidence has shown, a more normal state is that in which one form, say, tillage or hunting, is no more than a predominant one, while one or several other forms are in use, albeit subordinate. The Fan or Pahuin of equatorial Africa is primarily a hunter: but he also fishes, and, furthermore, cultivates bananas.

Our predecessors on the age-old surface of this Europe of ours, in the course of their work of deforestation, whether in relation to forests proper or to fen districts, have frequently left more or less circular thickets standing; Ordnance maps of France and of Germany still indicate their outlines. Now what were these men doing? While they were doing away with the forest, they continued to exploit it—a gleaning industry: above all they cultivated the soil and grew the indispensable cereals for food,—an agricultural industry: and, lastly, they reared some horses, or cattle, or swine, for which they found grazing ground along the faintly defined, or rather, variable, edge of the forest,—a pastoral industry.

Then too there are cases in which human occupations vary according to the seasons, and thereby bring into being a very complex mode of life, which we may term that of seasonal recurrence. The majority of our trees in these climates are those with deciduous foliage, that is, they multiply their organs and surfaces of transpiration by means of leaves during the warmer months, and shed these organs during the colder period, when they would prove useless and even dangerous; both changes adapting them to climatic conditions. They are, in fact, plants which are of one physiological type in summer, and of another in winter; hydrophytes in summer, they become xerophytes in winter. In the same way one may say of many groups of peasants in the Jura that they are agriculturists or herdsmen in summer, whereas in winter they turn into true artisans, wood-workers, or even watchmakers or jewellers. Elsewhere, in those parts of France that still remain forest-land, men who in spring, summer and autumn are highly specialised field-workers, in winter-time go to live in the forest and turn wood-cutters.

But what will be the result of the irresistible tendency of industrialism? It will tend to specialise not only the various occupations but also the processes related thereto, to suppress more and more those complex types, to introduce vigorous and persistent specialisation even in the depths of the mountains. But at present there still exist groups of men, homogeneous, energetic, living a life of their own, just as do, to recur to our former simile, beeches, oaks, and apple-trees, with a mode of life which combines heterogeneous modalities in the course of a year.

More striking still, men whose occupations and whose means of subsistence are the same year in and year out adopt quite distinct modalities of family and social life season by season. We are referring

more particularly to the Eskimo, the northerners who have not domesticated the reindeer and who live by hunting and fishing. In summer, these Eskimo disperse into tents; one tent, one family; whereas in winter they reunite in houses which are more or less subterranean and contain several apartments—what may be termed family cells. My proposal is that we should devote part of our time to an examination of this Eskimo life, by way of a monograph of the Human Geography of primitive man. I shall rely on the indispensable works of Rink, on Nansen's charming and keen-witted book, *Eskimoleben*, and, above all, on that perfect example of how to study social morphology which M. Mauss has given us.[1]

All the essential facts begin and end in facts of psychology. A fresh instance of this, and a typical one, will provide us with a short-cut to the point towards which we are hastening. We have heard of the "dry-farming" methods[2] which are destined to promote agriculture in arid or semi-arid regions, the antithesis of those of wet-farming, *i.e.* of cultivation by irrigation. In all ages dry-farming has been in use in the exacting regions bordering on the Mediterranean: but during the last twenty years the chief centre has been the United States, where it has been investigated, extolled and preached. The idea underlying dry-farming is this:—the more the earth is worked, the riper it becomes: the greater the extent to which the uppermost layer of the soil remains fine soil, the less does it settle and create that hard crust which interferes with the infiltration of rain-water and facilitates evaporation. The aim of dry-farming is to counteract shortage of rain by ensuring that the soil shall benefit to the utmost by all precipitation: the earth must be ready to imbibe the raindrops directly they fall and to hoard them up as far as needful from the surface. In these dry regions the rainfall is irregular and capricious in the extreme: if the soil is to be always ready the tillers must be always at work; plough, harrow and spade must be continually turning and re-turning, and that without any faith in the coming of the rain. How toilsome is such continual physical effort, how high a standard of moral perseverance are implied by such a method of cultivation! But, like man, the earth responds to training: it becomes easier and easier to work: it acquires the habit of remaining free instead of caking. We might almost say that the raindrops get out of the habit of stopping on the surface, and work their way down into the soil to do their utmost among the roots of the sown plants. In short, after ten years of such labour the same annual rainfall produces twice the effect it did. Man's persistent energy has obtained results equivalent to a change of climate.

There we see a psychological fact in the act of achievement—concentration of attention; orientation, thought-out and followed-up, of human will-power. If we interpreted all the facts of Human Geography

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[1] M. Mauss and H. Beuchat, "Essai sur les variations saisonnières des sociétés Eskimos" (*L'Année Sociologique*, 1904-5, pp. 39-130).

[2] Cf. Augustin Bernard, "Le 'Dry-farming' et ses applications dans l'Afrique du Nord" (*Annales de Géographie*, xx., 1911, pp. 411-430).

in a dry-farming region solely in the light of natural conditions, we should never succeed in understanding them: the data of the rain-gauge have been modified by men's co-ordinated efforts. The true rain-gauge there is human will-power.

On the other hand, men undoubtedly cannot work in this obstinate fashion for ten years on end without being markedly affected thereby: their moral temperament will be different from what it was ten years back. At the close of these ten years, then, a transformation has been effected in both the human beings and in their natural surroundings: they are new men on a new earth.

Such are the elements of the psychological interaction which lies at the root of Human Geography. The characteristics of the soil, its chemical composition, the configuration of localities, the trend of the relief, the articulation of the coast, the meteorological conditions of a country, the régime of its watercourses have, and always will have, their effect. How far-reaching that influence is we shall find as we go on: we shall always be assigning it a share. While it is the business of geographers to be aware to what extent natural surroundings are responsible for our earthly achievements, it is clear that their share is more or less called into existence by our own acts. The man is there, and the flint is there: but it is the man who makes the spark fly.

It is obvious then that men succeed in modifying natural conditions. It is not the districts whose natural fertility is greatest, or whose water-supply is most copious, that yield the richest harvests; that plain common-sense idea ought to be elevated into a fundamental truth. We may go further. Extreme cases occur in which unfavourable natural conditions have forced men into making better-planned and more persevering efforts, and, by prohibiting life on easy terms, have attuned, so to speak, human will-power to a higher pitch, and thereby have perfected his agricultural activities.

In the heart of the Sahara there are tracts of sand which are absolutely barren, and yet the Soafas have succeeded in raising the best yielding date-palm plantations of the desert. Without fountains and without streams, they discovered how to utilise subterranean lakes for the cultivation of these date-palms, which rank among the most delicate of trees. A little farther westwards, still in this same Sahara, lies the white, stern, bare, inhospitable stretch of the Sebkha; scattered about it are the oases of M'Zab, growing cereals, fruit trees, and date-palms; the water required for these is laboriously drawn from wells 120, 150, 200 feet deep. They are marvels of cultivation, and the cultivation is done by poor men as a hobby.

In the Balearic Islands, the two little villages wherein the fields which rise one above another in terraces are cultivated with the highest degree of perfection, are Estalienchs and Bañalbufar, in Majorca. Now, in the ordinary way, the fishermen and the tillers of the villages hereabouts form two distinct groups, in fact, they often live in separate villages some kilometres apart: but in the two villages in question the men who tend the vines are the same as those who fish; the olive trees on the terraces are cared for by men who are also sailors and coasting traders.

The greater the pressure brought to bear on men to win a living, the higher rises their productive faculty, and often the standard of quality too.

Over the tracts which human beings have wrested, with infinite trouble, from the sea, from the marsh, from the bog, tillage is spreading which is exceptionally deserving of admiration.[1] We shall immediately be studying together one of the instances in which these methods have been applied on the greatest scale and with the most signal success in a setting in which Nature is hostile. The Finns are near neighbours of ours, but they live on the northern limits of habitable land in Europe. For all that, they have achieved such success as not only to increase their own resources substantially, but even to turn their country into an exporter of food products: Finland butter is at this moment competing in London with Danish, Normandy, and Irish butter.

Without quitting the surface of our Earth—geographers should always remain unhesitating realists—we shall become conscious to what extent we must turn to ideas for enlightenment as to co-operation between Earth and Humanity. The case of Finland will prove specially valuable, inasmuch as it will enable us to see how beliefs which are strongly held by many succeed in communicating, albeit by channels but dimly perceptible, efficiency and quality even to the most material products of that group's collective activities. On this Earth of ours there are regions, and in the lives of human societies there occur moments, wherein some essential fact of Human Geography—the maintenance of a route, the driving of a furrow, the grafting of a tree, the blow of a pickaxe in a quarry, the casting of a net in the sea—wins its way through a series of commonplace, almost unthinking efforts to a state of perfection of striking world-wide importance. And why? Because, at that point and at that moment, a collective psychic impulse—the cohesion of a nation that is being born or being attacked, the pride of a people which is making history or is endeavouring to do so, a tradition of bounden duty, apostolic zeal for the triumph of a creed—reinforces the feeling that all are working for each other, multiplying thereby the potentialities of every individual act, however trivial. To the psychology of crowds, therefore, we shall sometimes have to look, and to that alone, for the explanation of exceptional fruitfulness in a given region.

Man's eye and brain convey certain impressions to him concerning the Universe, impressions which are to some extent his own creation. Not only does the surface of the Earth suffer changes at our hands, but our vision, our interpretation of it, undergo changes too. Widely different ideas from ours did our predecessors entertain concerning that strip of land that was theirs and is ours. And in so far as our vision is a new vision, the reality is likewise a new reality. That is the principal fact; change is upon it even when it is only we who are changing. But then, too,—as we have already pointed out—fundamental material changes

[1] Cf. E. Coquidé, *Recherches sur les propriétés des sols tourbeux de la Picardie*, Paris, 1912.

do take place—North America and South America become islands because human beings will it so, and that for all the geography of intercommunication of the future. It does alter, and that through us.

Of these two kinds of alterations, the former is frequently subconscious or unconscious, and consequently more or less collective; while the latter is far more conscious, and often has been predetermined by individual initiative previous to entering on its collective phase. The essence and aim of Human Geography, then, amount to this:—observation, analysis, and explanation of these twofold and never-ceasing transformations of the inhabited surface of our planet, which is successively, or often simultaneously, becoming *different to us and different by us.* "Successively" and "simultaneously": what characterises the ever-recurring and limitless interaction of either kind of transformation upon the other? Will it ever be practicable to define this with any certainty? A State ensues from a co-ordination of individuals and of groups which cannot be conceived without a material co-ordination between the various parts of the surface on which these individuals and groups exist. What is the minimum of connection necessary between a State, say, France or Switzerland, and its domain? What is the necessary connection between a city, a collection of citizens, and a town, a collection of houses and streets?

How far is spiritual co-ordination a function of material co-ordination, and how far does material co-ordination necessitate spiritual co-ordination? There we have the whole problem, and there, too, we have its geographical formula.

Can the mutual relations of these two kinds of co-ordination be ascertained more amply than in relation to particular cases, sufficiently so to enable us to look forward to a time when we may formulate their "law," in the fullest sense of the term? Is there a harmony, not antecedent but evolved, foreshadowing collective domination of the Earth, domination at once fruitful, peaceful, stable; a harmony capable of welding, if not into one group, at any rate into analogous or homologous groups, all peoples, all the historical aggregation of races and human societies? I do not know; as yet I can say nothing on the subject. That is what you and I will search after, in all humility and patience, in all the years that are to come.

MOZAMBIQUE: ITS AGRICULTURE AND DEVELOPMENT.[1]

(With Illustrations.)

THE author of this book, Mr. Robert Nunez Lyne, F.L.S., F.R.G.S., has already written on "Zanzibar in Contemporary Times," he having been Director of Agriculture at Zanzibar. At present he is Director of Agriculture in Ceylon, but he was also for some time Director of

[1] *Mozambique: Its Agriculture and Development.* By Robert N. Lyne. London: T. Fisher Unwin, 1913. Price 12s. 6d. net.

Agriculture in the Province of Mozambique. His latest work, proceeding as it does from an agricultural specialist, may thus be regarded as a volume of much practical value. He tells us in his Preface that "with

A good Coconut Palm.

the exception of the case of the clove industry of Zanzibar, which has been carried on by the Arabs for nearly a hundred years, agriculture on the East coast of Africa is in its infancy. This is especially so in Portuguese East Africa. Hence, no handbook of the agriculture of that country, with any pretence to authority, could as yet be written, and this book lays no claim to such. It is an epitome of the conclusions

American Tobacco in East Africa.

come to after an eighteen months' examination of the territory and its agricultural resources and prospects, and is an attempt to reveal Portuguese East Africa to the investor."

Mozambique possesses several natural advantages. Mr. Lyne points out that the Province is particularly favoured in its navigable rivers, and its enormous stretch of seaboard, and that it is also well placed as regards markets. While its rubber plantations compare favourably with those of German East Africa, the River Zambezi is pre-eminently associated with sugar-planting, cotton, cattle and tobacco. There are seven sugar factories at work in the Province of Mozambique. There is good coconut land in the delta of the Zambezi between the Chinde River and the main stream. There are probably a million hectares of Landolphia forests in the Province carrying rubber of the value, at £10 per hectare, of £10,000,000. Sisal hemp is being grown in several parts of the Province, notably in Quilimane, where there are close upon three million plants in cultivation.

The most profitable planting industry in East Africa at present is probably that of tobacco-planting in Nyasaland, and there is no reason why it should not also succeed in Portuguese East Africa. Cotton is also making headway in Nyasaland, and it is safe to predict a future for it in Mozambique. In the oil-producing *Trichilia emetica* tree, the country of the lower Limpopo and on to Lourenzo Marques possesses an enormous source of wealth as yet practically untapped. The cashew-nut tree ought to furnish Inhambane with another extensive means of wealth.

Cattle-breeding and dairying are also making good progress in Mozambique, but there is only a limited future for fruit-farming. Many miles of river bank at Lourenzo Marques could be put under lucerne, which is an irrigation crop. The cultivation of vanilla, nutmegs, cinnamon and other spices will probably attract attention when settlers begin to enter the country, but timber will never become an important article of export because of the cost of transport.

One of the difficulties of developing East Africa is caused by the scarcity of labour arising from three circumstances, viz. (1) a sparse population; (2) the indolent disposition of the natives; and (3) the inexperience of white employers. Africans, taken as a whole, dislike regular work. The natives often also show a predilection for intoxicants. In Mozambique it is generally Portuguese wine, in Nigeria gin.

The volume concludes with "Notes on Ceara Rubber in East Africa," and a translation of "The Land Law for the Province of Mozambique," approved by decree of 9th July 1909. It has a good map of the Province, and index, and should be indispensable for every emigrant to Mozambique or investor in its industries. By the courtesy of the publishers we are enabled to reproduce here two of the illustrations.

GEOGRAPHICAL NOTES.

Australasia.

Dr. Wollaston's Expedition to New Guinea.—Dr. Wollaston returned last year to New Guinea with a new expedition to the Snow Mountains, in order to make another attempt on Mount Carstensz, which the last expedition did not succeed in ascending. The present expedition was more successful, though the difficulties proved very great.

After proceeding to Batavia to confer with the Dutch authorities, Dr. Wollaston went to Borneo, and spent eight weeks collecting Dyaks before returning to Batavia. Here he was joined by Mr. C. B. Kloss, curator of the Kuala Lumpor Museum, and the two, with five native collectors and seventy-five Dyaks, proceeded in a Dutch Government ship to the south coast of Dutch New Guinea. They were escorted by forty Dutch soldiers and eighty convicts from Batavia under a Dutch officer.

Last September the party disembarked at the mouth of the Utakwa River, which had been ascended by Dutch travellers two years previously, and appeared to be the best route into the unknown interior. From the deck of the ship could be seen the snow-capped peaks of Carstensz. A motor boat that had been built in England and all the stores and equipment were landed, and a base camp made twenty miles up this river. All this region was quite uninhabited, and the expedition had to carry all its own food. Canoes were made by the Dyaks, and the river was ascended for two days beyond the base, but thereafter the expedition travelled by land. Depôts were established three days' travel apart, the first being three days' march up the foothills of the Snow Range. From the fourth depôt the ascent was made to the snow line. Progress was very slow, the ridges being appallingly steep and the track rough.

In the high mountains the sun was never visible except for an hour in the morning, and the travellers were always in the clouds. At about five thousand feet the expedition met some curious but friendly folk of smallish stature, who showed the travellers their track, and helped them. They were not, however, pigmies. They are a rather small people of the Papuan type, and are of a dark chocolate-brown colour. They wear no clothing, notwithstanding that at the altitude at which they live it is very cold at night. In some respects they are more intelligent than the people on the coast. They are a race of cultivators, growing sweet potatoes, tobacco, and sugar-cane. They carry bows and arrows, and when they travel they sling over their shoulders bags containing apparatus for producing fire, their tobacco, knives, spoons, and so forth. Sweet potatoes, which they roast in a fire, form their staple food. They dig out the inside of the potato with a spoon made of the shoulder-blade of a pig or other animal. Their knives are made of stone of a hard, slaty variety which takes a very fine edge, and is made so sharp as to enable the user to cut a bamboo with it. A stone axe, which they also employ, is likewise susceptible of receiving a sharp cutting edge.

As regards their means of subsistence, they live from hand to mouth,

killing rats, mice, and any other small animals they can find, and shooting birds with their bows and arrows, thus eking out the small resources derived from cultivation.

The highest point (15,000 feet) was reached after five days' march from the last base. The rain descended in a continuous torrent, and although Mount Carstensz is close to the equator, the fog-laden air was freezingly cold. During the ascent a fine panorama was observed, but the mist again closed in, and when the party were within a very short distance of the top the steep surface and dense fog necessitated a retreat. Two attempts to reach the actual summit were made, but eventually food gave out. As the last load was being taken to the base camp the canoe containing Dr. Wollaston and six Dyaks struck a snag in a swirling torrent and capsized. Dr. Wollaston was carried a long way down stream, and was almost completely exhausted. Much valuable property was lost, including maps, cameras, instruments and three months' diaries. The expedition secured an important collection of birds and plants.

Polar.

The Australian Antarctic Expedition.—In a short note in our April issue (p. 205) we noted the fact that Captain Davis, in the *Aurora*, took off Mr. Wild's party of eight. Mr. Wild has recently communicated to Reuter's agency an account of the experiences of this party, from which the following is taken:—

"The party under my command were G. H. Dovers, surveyor; C. Harrison, artist and biologist; A. C. Hoadley, geologist; B. E. Jones, surgeon; A. L. Kennedy, magnetician; J. H. Hoyes, meteorologist; and A. D. Watson, geologist. We left Mawson at his base in Adélie Land on January 19 of last year with orders to form a second base on Sabrina Land or Knox Land. The former we soon ascertained did not exist, and the impenetrable pack prevented us from getting within sixty miles of Knox Land, with the result that instead of 400 miles we cruised for 1300 miles and still found no chance of landing. On February 11 we sighted a glacier which had probably been mistaken by Wilkes for Termination Land, and on 15th found a landing. This being Shackleton's birthday, we named it Shackleton Glacier. It looked an impossible spot. It was clearly a moving glacier, and its terrible cliffs, a hundred feet high, were badly broken and crevassed. Landing our hut, stores, etc., and hoisting them up the dangerous cliff was a long and difficult business, and our next care was to move them from the broken edge to a spot 640 yards distant, where we erected our hut. The temperature varied 40 degrees, dropping as low as −15° Fahr. We covered 105 miles drawing stores between the glacier edge and the hut. We next made preparations for sledging, but were detained until the middle of March by blizzards and snow-drifts 15 feet in depth.

"In the meantime, all sea ice blew away, leaving us with a perpendicular glacier edge, up which it was impossible for penguins or seals to reach, and for five months we had to depend entirely on tinned foods.

As soon as the weather permitted, a party of six left the hut to lay out a depot on land, which we could see to the south 17 miles distant from our glacier. Kennedy and Watson were left at the base. Although in a direct line the land lay 17 miles off, our first journey to it was 88 miles in length. After eight days' travelling we reached a spot 35 miles inland at an altitude of 2200 feet. Crevasses abounded, and from March 21 for a period of nine days we were kept in camp by the same blizzard which proved fatal to Scott and his gallant companions. We soon found it impossible to go on, and turned back for home. Carrying only 50 lb. per man, the going was so hard that we only covered a mile and a quarter in eight hours down hill and sinking three feet in snow. When two miles from our hut, another blizzard held us up. One tent collapsed, and its three occupants were unable to move or get food for thirty-six hours.

"The days were now becoming too short and the weather too uncertain for extensive sledge work, and we made preparations for winter. In August we again made preparations for sledging, one party of three going eastward and another to west. The latter surveyed all the coastline to the point reached by the German Expedition of 1902. The western party did most of its travelling on land at an altitude of 2000 to 3000 feet. On one trip it did 510 miles at that altitude. This party discovered the largest Emperor penguin rookery ever recorded. This was on an island sixty-five miles west of our glacier hut, and here were congregated some seven thousand young Emperor birds, in addition to innumerable ordinary penguins. The eastern party surveyed as far as 101° east longitude, and the west inland for fifty miles, reaching an altitude of 4500 feet. The blizzards were very severe; one exceptionally bad one split a tent and caused the others to collapse. We were thus without shelter in a hundred-miles-an-hour wind. For five days we lay in a covered hole twelve feet by six feet by three feet. At intervals awful avalanches crashed down from a 600-feet cliff 400 yards from us, while giant boulders of ice, weighing twenty tons, came to within a hundred yards of our hole, which three months later was itself engulfed.

"On Christmas Day we formally took possession of Queen Mary's Land, and hoisted the Union Jack. I called my companions together to witness the act, as we took the land in the name of the Australian expedition for King George V. The land is a continuation of King Edward VII. plateau, and has a coastline of 350 miles, and ascends gradually, probably to the Pole itself."

Mr. Stefansson's Expedition to the Arctic.—Mr. Stefansson's expedition, which includes among its members Mr. James Murray, who, it will be remembered, was a member of the Scottish Loch Survey, and also accompanied the British Antarctic expedition of 1907-9, has made a start from Esquimalt. The whaler *Karluk* (not *Kamluk*, as stated in our previous note, p. 204) left that port on June 17 for Nome (Alaska). Mr. Stefansson, Dr. Anderson, and Mr. James Murray will join the ship there at the end of the first week of July. At this port the ship will put in

only long enough to replenish stores, and thence proceed to Point Barrow, which is to be reached about July 25, the earliest possible date on account of the ice. If wind is easterly the explorers will sail into the Beaufort Sea. If, in turn, the Beaufort Sea is open and the *Karluk* gets to Herschel safely, eight men under the commander, Dr. Anderson, comprising the southern section, will disembark and sail eastward in the auxiliary vessel with stores and scientific equipment to Victoria Island. There a second base will be established.

Mr. Stefansson in the *Karluk* will go northward to Patrick Land, where he will make his first base, and then by boat or dog-sledge explore as far north as possible the unknown Arctic region. The *Karluk* will return to Victoria in November, and sail back to the Arctic in the summer of 1914 with fresh stores and mails for the expedition.

General.

The Birmingham Meeting of the British Association.—The arrangements for this meeting, which is to open on Wednesday, September 10, are now far advanced, and the attendance promises to be large. Though it has been found impossible to house the whole of the sections and the offices of the association in one building, the buildings utilised all lie within easy reach of one another. Eight of the thirteen sections are to be housed in Mason College, the remaining five finding quarters elsewhere. Geography is to find a home in the lecture theatre of the Midland Institute.

Of the evening discourses one will be delivered by Dr. Smith Woodward, of the British Museum, and will be on missing links among extinct animals. A handbook and an excursion guidebook are being prepared, the former containing some geological and topographical maps prepared under the guidance and help of Professor Lapworth, which are described as marking an epoch in map-making. Numerous excursions have been arranged for, and a considerable number of entertainments will also be provided.

Commercial Geography.

Mineral Wealth of Canada and United States.—A note in a recent issue of *Science* gives some interesting figures comparing the produce of the mines of Canada and the United States. In 1911 the total value of the mineral produce of Canada was 103,220,994 dollars, or 14·42 dollars per head: during the same year the United States produced minerals valued at 1,918,326,253 dollars. Among the provinces of Canada, Ontario led with a total value of nearly 43,000,000 dollars, British Columbia following with a value of 21,000,000. The most valuable Canadian product was coal, 26½ million dollars. This is true also of the United States where, however, coal to the value of 327 million dollars was obtained. Only as regards nickel does any Canadian product exceed in value those of the United States. The Canadian produce of nickel was in 1911 worth over 10 million dollars, while that of

the United States was very insignificant. Of the total Canadian produce, exports amounting to over 33 million dollars went to the United States, while under 7 million dollars' worth went to the United Kingdom. It is to be noted, however, that there is considerable interchange of mineral produce across the United States frontier. Coal especially is both exported to the States and imported from them, according to local supplies.

The preliminary figures for 1912 show a great increase in the production of minerals in Canada, the total value being 133 million dollars, as compared with 103 million in 1911.

The Lötschberg Tunnel.—We have recorded here from time to time the progress of this tunnel, and it is of interest to note that the opening of the new direct route to Italy through the tunnel is announced for July 15. There will be three expresses daily each way, and the fastest of these will accomplish the distance between Paris and Milan in $16\frac{1}{4}$ hours.

Personal.—Mr. A. R. Hinks, F.R.S., chief assistant at the Cambridge Observatory, and University lecturer in surveying and cartography, has been appointed Assistant Secretary of the Royal Geographical Society.

EDUCATIONAL.

We are informed that a Yorkshire Summer School of Geography has been instituted by the Universities of Leeds and Sheffield, in co-operation with Armstrong College, Newcastle-upon-Tyne, and with the help of the Education Committees of the County Councils of the North, West, and East Ridings of Yorkshire, and of the County Boroughs of Bradford, Huddersfield, Hull, Leeds, Middlesbrough, Sheffield, and York. For the present year, the work of organisation has been undertaken by the University of Leeds.

The headquarters of the School will, this year, be the County School, Whitby, the school buildings having been kindly lent by the Governors for this purpose.

The course will consist of lectures, laboratory-work, field-work, and demonstrations. Lectures will begin on Monday morning, August 4, and the course will end on Saturday, August 23. Two lectures will be given on each of five mornings in each week of the course. There will also be occasional evening lectures and discussions. The laboratory-work will include map-reading, methods of map-enlargement, and the making of relief-maps. The field-work will comprise plane-table and contour work. All the apparatus used will be simple and inexpensive. Methods applicable to school-work will be adopted. There will be three or four whole-day excursions, and eight afternoon excursions for field-work. The staff of teachers will be large in order that in laboratory-work the students may receive individual attention.

Lectures will be given on the following subjects :—The Geological Structure of Yorkshire, with especial reference to Relief and Mineral Distribution : The Historical Geography of Yorkshire, including pre-historic, Roman, Saxon, Danish, Medieval and Military Geography : Language and Place-names of Yorkshire : Sites of Towns : Architecture : The Vegetation and Agriculture of Yorkshire : The General Economic Geography of the Yorkshire area : Yorkshire Mining, past and present : The Textile and Iron and Steel Industries of Yorkshire ; Meteorology ; The Teaching of Geography.

Among the lecturers will be Professor Kendall, M.Sc., F.G.S. (Professor of Geology in the University of Leeds) : Professor F. W. Moorman, B.A., Ph.D. (Professor of English Language) : Mr. A. Gilligan, B.Sc., F.G.S. (Assistant Lecturer and Demonstrator in Geology) : Mr. L. Rodwell Jones, B.Sc. (Assistant Lecturer in Geography) : Dr. W. G. Smith, Ph.D. (Lecturer at the Edinburgh and East of Scotland College of Agriculture) : Mr. W. P. Welpton, B.Sc. (Lecturer in Education and Master of Method in the University of Leeds) : Mr. P. W. Dodd, B.A. (Assistant Lecturer in Classics). Certificates will be granted at the end of the course to students who have made a complete attendance at the lectures, practical classes, etc.

The charge for admission to the whole course of instruction is £3. It is proposed to limit the numbers to about two hundred. Applications for tickets should be made, with remittance, to the Secretary of the Yorkshire Summer School of Geography, The University, Leeds.

In the *Report* for the year 1912-13 of the Royal Scottish Museum, Edinburgh, we note that an Advising Committee on Education has now been appointed in connection with the Museum, with the objects of encouraging teachers and pupils to make greater use of the Museum, and of shaping the exhibits in the School Gallery to direct educational needs. It is proposed to issue a list with short descriptions of the objects which may best be employed by teachers as illustrations, and the Committee has also favourably considered the proposal to purchase certain Educational models for the Museum, notably a planetarium. This will show the sun and planets with their satellites, the planets and their satellites revolving with a velocity proportionate to their true velocity. The whole will be surrounded by a glass sphere about five feet in diameter, on which the stars of the best-known constellations are indicated. The whole mechanism will be worked by electricity and will be so arranged that it can be set in motion by pressing a button.

The *Report* gives also some account of the very popular lantern demonstrations which were held in the Museum during last winter. As the list given shows many of these had a more or less direct geographical bearing, and the Museum itself of course contains many objects of great interest to the geographical teacher. The efforts of Sir T. Carlaw Martin and those associated with him to render the Museum more useful and more accessible to teachers and pupils will therefore receive grateful acknowledgment from all those interested in geographical education.

NEW BOOKS.

EUROPE.

My Russian Year. By Rothay Reynolds. London: Mills and Boon, Ltd., 1913. *Price* 10*s.* 6*d. net.*

In this cleverly written and entertaining book we have a series of sketches portraying all sorts and conditions of men in Russia, and the general impression it conveys is that Russia is a land of most extraordinary contrasts, intellect and learning side by side with stupidity and ignorance, piety and religion with superstition and bigotry, charity and gentleness with hatred and cruelty, opulence and wealth with poverty and degradation, tyranny and arbitrariness with a paternal Government solicitous to undertake everything for its subjects. We do not forget that similar contrasts may be observed in many other countries, but it is a matter of proportion, and in Russia the contrasts are, according to the writer, unusually sharp, so much so that it may be called the land of paradox. The author has evidently travelled much in the interior as well as in the cities, and has been able to win the confidence of revolutionists and reactionaries both male and female, and not the least interesting part of this book is the insight it gives us into the train of thought, we might even call it the philosophy of these classes. There is an amusing as well as instructive chapter on prison-life, the anomalies and peculiarities of which are strange to our British ideas. No good account of the Russia of to-day could omit to accentuate the extraordinary influence of the religion of the Orthodox Greek Church, which permeates more or less through every grade in society in one shape or another, and this feature of the country receives ample attention in this book. The chapters on the Black and White Clergy are excellent, and so also are the two quaint tales told by Dimitri, which throw a brilliant as well as a humorous light on the religious intellectuality of the peasants. *My Russian Year* gives us a good impression of the profoundly perplexing and intricate problems which constitute the difficulty now confronting the Russian Government. They are the result of the huge area of the country, its geography, variety of races, religion, history, education, etc., combined with an antiquated system of government which insists on keeping its subjects in leading strings, thereby evoking more or less general discontent which takes every form of expressing itself from sullen despair to the ready use of dynamite. The graver interest of the book is lightened and indeed sustained by many anecdotes and conversations told with much vivacity and literary skill.

Rambles in Holland. By Edwin and Marion Sharpe Grew. London: Mills and Boon, Ltd., 1913. *Price* 6*s.*

In our February number we noticed a cleverly written book *Through Holland in the Vivette*, which describes one way of seeing Holland, viz., from the deck of a yacht. In this book we have an excellent description of the country as seen from the railway and motor-car. It so happens that this year thousands of people will be flocking to Holland. Not only is there the special attraction of the formal inauguration of the Palace of Peace at the Hague, but in almost every place of importance there are to be exhibitions and festivities in honour of the centenary of the liberation of the Dutch from Napoleonic rule. Instead of concentrating their activities on one spot, the Dutch have decided to hold local exhibitions wherever local industries and circumstances indicate a good chance of success. Thus there will be a maritime exhibition at Amsterdam,

an agricultural and horticultural exhibition at the Hague, a rose exhibition at Boskoop, a bulb exhibition at Haarlem, and so on, and it is needless to add that the exhibitions of Dutch fine arts at Utrecht, etc., will be well worthy of the traditions of the nation. The volume now before us can be confidently commended as well worth study both beforehand and on the spot by any of our readers who think of going to Holland. It is a most interesting and judicious *mélange*. The reader will find many well-told anecdotes and episodes from the romantic and glorious history of the nation: much useful information regarding local industries and economic conditions, both past and present, without an excessive use of statistics; many wise and discriminating observations about the fine arts, more especially architecture, both secular and ecclesiastical; and plenty of hints and suggestions, attention to which will save much time and trouble, and greatly facilitate the traveller's movements. We may add that there are a number of very good photographic illustrations.

ASIA.

The Duab of Turkestan. By W. Rickmer Rickmers. Cambridge: At the University Press, 1913. *Price* 30*s. net.*

Mr. Rickmers has had a long and varied experience of Bokhara, and we trust that the members of this Society have not forgotten, that so long ago as the year 1900 he lectured on Bokhara in Edinburgh and at the branches. In this handsome and beautifully illustrated volume we have the account of his later wanderings, explorations and mountaineering in the territory between the Jaxartes and the Oxus, the Sir-Darya and the Amu-Darya, the Duab of Turkestan. The work is essentially a study of physiography and geology, but the author goes far afield, and has many acute and instructive observations to offer on the climate, zoology and botany of the tract, and also on the political and economic conditions of its inhabitants. Cordially received as old friends, he and his party were welcomed wherever they went, alike by the Russian authorities, and by the local chiefs. Except on one occasion, they were never in danger of personal violence, but in the course of their wanderings and climbing they fell in with many difficulties, and it is very evident that a cool head and wary movement are quite as necessary in the mountains of Turkestan as in the Alps or the Andes. Mr. Rickmers has had much experience in mountaineering in other countries, and not the least valuable part of this work is the instructive comparisons which are drawn from time to time between the conditions and methods of similar expeditions elsewhere. For example, his remarks on the well-known phenomenon of mountain nausea are well worth comparing with the accounts we have of it in the Andes by Sir Martin Conway, and in the Karakorams by Mrs. Bullock Workman and the historian of the Duke of the Abruzzi's expedition. The work is, as we have said, principally a study in physiography, and the narrative does not maintain a chronological sequence. For instance, we have an interesting account of an expedition to Karshi in 1898 followed a few pages afterwards by an account of an ascent of the Kemkutan peak near Samarkand in 1907. Other expeditions to the mountains of Urgat, the Fan or Hazret Sultan, the range of Peter the Great, etc., are described with great wealth of details bearing on the physiography and geology of the tract. Vivid and sparkling descriptions of important towns such as Samarkand and Bokhara lend a pleasing variety to the severer features of the book. It was at the camp at Landan, in the Chapdara mountains, that Mr. Rickmers and his wife—a granddaughter of the well-known Dr. Alexander Duff, who read an

interesting paper on her travels with her husband and Dr. Krafft in Eastern Bokhara to the British Association in 1898, and who is the authoress of the standard work on the *Chronology of India*—were for a brief space of time in danger of their lives from robbers. Great prominence is given to the Zarafshan river, the 400 miles course of which is minutely traced from its source in a glacier near the Igol peak in the Alai range to where it disappears in the sands south-west of the city of Bokhara, and Mr. Rickmers succeeds in investing the river with an unwonted variety of interest.

Excellent maps and indices greatly facilitate the reader in enjoying this book, but the numerous illustrations deserve special notice. Many of them considered merely as representations of landscapes are exceedingly beautiful, and many of them are exceptionally illuminative as well as beautiful, because they assist the reader materially in visualising to himself the scenery described under varied and strange climatic and physiological conditions, the representation of which is the chief object of the book.

Notre France d'Extrême-Orient. Par le Duc de Montpensier. Paris: Perrin et Cie, 1913. *Prix* 5 *fr.*

By the publication of this work the Duc de Montpensier concludes his exposition of his study of French Indo-China during the five years which he spent there. In his former volumes he gave us the lighter side of the subject, and in this volume we have his views on more serious topics, ethnographical, political, economic, etc. They are set forth in crisp and graceful language, lucid and vivid, such as we find in good French authors, modest also and undogmatic, which impresses the reader with a sense of the author's impartiality and accuracy, and as they are the result of patient careful study of the conditions of Indo-China by an able and dispassionate observer they are well worth the attention of the French Colonial Office. The Duc without unwise optimism or equally unwise chauvinism anticipates a great future for the French empire in the East. He sets forth in much detail—too much detail perhaps for an English reader, but not too much for a French one making a serious study of the subject—its natural resources, its capabilities, the distribution of the many different races which inhabit Indo-China, an estimate of their social conditions, and the causes which contribute to or retard material progress. French Indo-China, like French Equatorial Africa, has suffered from the ill-timed parsimony and neglect of the home authorities, but its prospects are brighter than those of French Equatorial Africa, for it appears that the home Government is now making a serious effort to effect what is a primary necessity of development, viz., a great increase and improvement in the various methods of communication between the principal towns and villages and to connect them with the sea. Indo-China has had the good fortune to have had as Governors-General some excellent administrators, and it is noticeable that the Duc de Montpensier does not animadvert on the frequent changes of officials, which have been so often the subject of just complaint in other colonies. One of the most interesting chapters is that in which he describes the system of government, which in some respects resembles the system established in British India while differing from it in others; another chapter, and one much too short, treats of the local literature, and relates two or three charmingly quaint fairy tales. In their Indo-China empire the French are wisely recognising that they have to deal with many races differing from each other widely in origin, civilisation, development, and progress, and are adapting their methods of government to existing conditions. A Government working on these sagacious and

kindly principles is sure of success, although it must be a work of patience and time – success which, one day, will fulfil the patriotic hope of the author that Indo-China will be "un des joyaux les plus précieux du collier glorieux de notre belle France."

By Desert Ways to Baghdad. By Louisa Jebb. London, Edinburgh, Dublin and New York: Thomas Nelson and Sons, 1912. *Price* 1*s. net.*

This volume contains a pleasantly written series of sketches of a journey from Brusa in Asia Minor to Bagdad, Damascus, and Palmyra. The travellers were two plucky English ladies, who, at first at any rate, knew no Arabic. They had, however, good luck, and came in for no worse mishaps than rainstorms and malarial fever; on the other hand, they had often to rough it in many ways, all of which they seem to have enjoyed heartily. Perhaps the best chapters in the book are those describing the descent of the Tigris on a raft from Diarbekir to Bagdad.

AFRICA.

D'Alger à Tombouctou. Par Comte René Le More. Paris: Plon-Nourrit et Cie, 1913. *Prix* 3 *fr.* 50.

This volume contains an account of a very plucky and successful journey of fifteen months' duration from Algiers to Timbuctu and back, right across the desert. On his way to Timbuctu Count René Le More proceeded from station to station occupied by French troops, but on his return journey he, for a part of the way, took a short cut through a more dangerous, because less known tract. He had various difficulties to contend with, such as malarial fever, and the chance of finding himself and his party without water, but above all, his real danger was from roving bands of Tuaregs, who may be justly called the pirates of the desert. Under any circumstances the journey is an arduous one, and it tested the Count's physique pretty severely. The narrative is very simply and modestly written, and gives useful hints on many points, mostly military, and some commercial, in connection with the various places passed en route. The Count seems anxious to establish an aeroplane service between Algiers and Timbuctu, a project which, some years ago, might have emanated from the fertile brain of Jules Verne, but here we have it calmly worked out in detail, and the Count is ready to make the first aerial journey. The advantages, on which he relies to recommend his project to the authorities, are that the journey through the air will be much quicker and healthier than the present toilsome and unhealthy one across the desert on camels, and that the service once established would put an end to Tuareg raids, and so stimulate commerce, and effect considerable reductions in the military budget. The French now lead the way in aerial science, and it would be rash to say that such a service as the Count contemplates is impossible.

Les Deux Congo. Par Baron Jehan de Witte. Paris: Librairie Plon-Nourrit et Cie, 1913. *Prix* 4 *fr.*

The two Congos which are the subject-matter of this book are the French and the Belgian. The story of the French Congo is treated from the missionary point of view, and may be described as an enthusiastic eulogistic account of the rise and spread of Christianity under the auspices of the Roman Catholic Church. The author follows the missionaries from their arrival in 1843 up to the present day,

laying much, but not too much, stress on the special work of Père Augouard, who by his labours of thirty-five years has justly earned the title of the Apostle of the Congo. In the course of his career he encountered perils and dangers such as rarely fall to the lot of men, but he persevered and succeeded in founding and fostering missions, churches, schools, and even farms in the midst of savage cannibal tribes under conditions which might well have daunted the most adventurous spirit. It is no vain boast that in French Congo the missionaries have done more to open up the country than any other agency. For the details of the story we must refer our readers to the book itself. Incidentally it throws much light on the condition of the inhabitants and the gross mismanagement of the country owing to the neglect of the Government to attend to the elementary principles of good administration. Attention has often been directed to the constant changes of officials, obviously so detrimental to good government (cf. *L'Afrique Équatoriale Française*, par Maurice Boudet-Saint, *S.G.M.*, vol. xxviii. p. 491). Baron de Witte gives us some examples of this, on which comment is needless; there were 10 administrators in Brazzaville in two years, 7 in Cap-Lopez in one year, and 14 governors in Gabon in fifteen years, "fonctionnaires éphémères" as he justly calls them. The conclusion of this part of the book is a wail against the action of M. Caillard, who, after the affair of Agadir, ceded to Germany 275,000 square kilometres of fertile land on the east of the Cameroons in exchange for 14,000 square kilometres of swamp on the north. The second part, dealing with the Belgian Congo, is practically a *résumé* of the action of King Leopold II. from 1876 till his death. The Baron does full justice to the astuteness and tenacity of purpose of the king, but denounces his duplicity and greed. Into this subject we need not follow him. Dislike of England and distrust of Germany are both very apparent throughout the work.

The Land of Zinj. By Captain C. H. Stigand. London: Constable and Co., Ltd., 1913. *Price* 15*s. net.*

Captain Stigand, of the King's African Rifles, is well known as a mighty Nimrod, who has seen much service in British East Africa and Egypt, and some years ago made an adventurous expedition from Uganda by Lake Rudolph to Abyssinia (*S.G.M.*, vol. xxvi. p. 500). In this volume he has brought together the notes and observations of his long service regarding the many tribes and peoples with whom he has come in contact, and in so doing he has made a notable contribution to our knowledge of the anthropology of the Protectorate. He introduces his subject "The Land of Zinj," or "the land of the blacks," by a brief but fairly complete compilation of what is known of its history from various documents and authors beginning with the days of King Solomon. Amidst a mass of mixed material it is often hard to distinguish what is trustworthy from what is merely legendary or mythical. He was not allowed access to the original Swahili records, which are apparently kept studiously concealed, but his information was received first-hand from a direct descendant of the Pate Sultans, and taken down by Captain Stigand to his dictation. The greater and most instructive part of the book consists of a detailed description of the geography of the tract and of the distribution of the inhabitants, with copious notes on their appearance, dress, habits, laws, ceremonies, religion, economic conditions, character, etc. He has spared no pains to expiscate the minute differences in the customs, etc., of the tribes, and apparently he was able to ingratiate himself with them, so that they have not concealed from him anything he wished to ascertain. When it is remembered that he has had experience of more than a hundred tribes, it will be readily

understood that this book is a valuable contribution to our knowledge of the anthropology of the tract. In the last chapters Captain Stigand deals with the thorny problem of the African and his future. He accepts as beyond controversy that for good or evil the European has taken over Africa, and is responsible for the African's future. But he earnestly deprecates over-haste in the process of civilisation, urging that in the case of many tribes the native is richer, happier, and better than he would be semi-civilised. He suggests that the most promising tribes should be placed in reserved tracts, where they would develop on their own lines under the paternal supervision of European officers, but preserved from the contamination inevitable when their country is open to traders of any race. He denounces the present system of education, viz., teaching the natives to read and write English, and he would substitute education in cleanliness, sanitation, and agriculture. He would relegate "the indolent and worthless" tribes to be the hewers of wood and drawers of water for the Europeans and rest of the community. It is obviously beyond our province to enter on a discussion of such a contentious subject, but we think we have said enough to indicate that *The Land of Zinj* is an exceedingly interesting and instructive work, and one well worthy of the perusal of our readers. We must add that it is illustrated by many good photographs, and is equipped with an excellent map.

AMERICA.

Latin America. By F. Garcia Calderon. London : T. Fisher Unwin. *Price* 10*s.* 6*d. net.*

In this volume a young Peruvian diplomatist has essayed what is wellnigh an impossible task, viz. to give in the compass of 400 pages an appreciation of the rise and progress of the score of large and small republics on the other side of the Atlantic which he includes in Latin America. He proposes to himself to lay before his readers "a balance-sheet" of these republics, sketching their tangled history, the races from which their populations are drawn, their condition, intellectual, economic, political, religious, ethical, etc., the evolution by which they have reached their present condition, and their probable future. The mere statement of such a subject indicates the width of its scope and the difficulties surrounding it. On the whole M. Calderon has done ample justice to his subject from his own point of view, subject to the limitations of space imposed on him. He points to the broad fact that, notwithstanding the diversity of races and geographical and economic conditions within the various republics, their histories present at least one feature in common, viz. that after the struggle for independence of a century ago they pass through a more or less lengthy period of what may be called anarchy. Colombia, for example, has had twenty-seven civil wars. "Uruguay," says Mr. Bryce in his *South America*, "saw more incessant fighting from 1810 to 1876 than any other part of the world has seen for the last hundred years, and even since then risings and conflicts have been frequent." The rule of military dictators lasts for a greater or a shorter period, and is succeeded by "civilism," which, according to M. Calderon, is fatal to clericalism ; civilism is succeeded by plutocracy ; and after a lapse of nearly a century only five states, Argentina, Brazil, Chili, Peru, and Bolivia, have made serious attempts to institute constitutional government. It would be interesting to contrast the views of the South American diplomatist, M. Calderon, with those of the Anglo-Saxon diplomatist, Mr. Bryce, but limitations of space preclude us from entering upon so fascinating a comparison. It is well known that the Latin republics of America are at various stages of political, industrial and economic development, and M. Calderon has many shrewd

and judicious observations as to the causes of progress or delay in their national development. His observations on the effects of the climate, geography, intermixture of races, religion, education, etc., and on the possibilities of foreign interference are well worth serious study, and here again a comparison with Mr. Bryce's observations might profitably be made. As to the future, M. Calderon lays much stress on the inevitable rearrangement of the trade and commerce of the world which will result from the opening of the Panama Canal. We observe that he takes a very gloomy view of the future of England. "England has reached the zenith of her industrial period, the maximum of her political development; the figures of the birth-rate in the industrial towns are diminishing, and emigration has almost ceased. The State is becoming the protector of a demagogic and decadent crowd."

We trust we have said enough to show to our readers that this volume is one of intense and varied interest, all the more so because readers, politicians or economists, on both sides of the Atlantic will find much in it that they are inclined to dispute. To many readers the most interesting part of the book will be the preface, which has been contributed by M. Poincaré, now President of the French Republic. The preface is, in fact, a thoughtful and appreciative review.

The Panama Canal. By JOHN BARRETT. Washington, D.C., U.S.A.: Pan-American Union, 1913. *Price* $1.00.

Mr. Barrett is Director General of the Pan-American Union, which is an "international organisation and office maintained by the twenty-one American republics . . . and devoted to the development of commerce, friendly intercourse, good understanding, and peace among all the American republics," and it will be readily admitted that in at least a good many of these republics, there is ample scope for the further development of these essentials of prosperity and stability. This little book is designed to answer two important questions about the Panama Canal, viz., what it is and what it means. It bristles with facts and statistics of intense interest, not only to those who live on the other side of the Atlantic, but to practically the whole civilised world. Panama and its wonderful Canal have been much in evidence of late years, and have received ample attention from this Society. In 1910 (*S.G.M.*, vol. xxvi. p. 148), we had an interesting lecture from Mr. Cornish, describing the engineering features of the work while it was in progress: in 1911 (*S.G.M.*, vol. xxvii. page 17), we had an instructive article by Mr. Peddie on the various former projects to cut through the Isthmus, some of them dating from the early years of the sixteenth century; in 1912 (*S.G.M.*, vol. xxviii. p. 330), there is a review of a clever book by Arthur Brellard (Albert Edwards) describing the Canal two years after Mr. Cornish had seen it; now, this book by the Director of the Pan-American Union brings the story up to date. It seems primarily intended for the use of tourists who go to see the Canal, and it is also an advertisement of how to go, what to see, and where to stay: it describes the local engineering and sanitary problems, and how they have been overcome, and it attempts to furnish an answer to the difficult question of what will be the results to the world when the Canal is ready. Mr. Barrett writes with exceptional knowledge, for he has been United States Ambassador in Panama, and he has produced an excellent compendium of information sufficient to furnish an answer to almost any question. The book is profusely illustrated, and has several excellent maps.

GENERAL.

Doreen Coasting. Edited by Alys Lowth. London: Longmans, Green and Co., 1912. *Price* 10*s.* 6*d.*

Doreen, being seized with a sudden desire, such as comes to many of us at times, to see the world, took boat for Africa, and this book is an account of her travels. The life on board, with its dances and its gossip, its quarrels and reconciliations, is recounted in a pleasant enough fashion, and numerous photographs may give those who must stay at home some idea of the places Doreen saw in her "coasting."

Weather Science. By R. G. K. Lempfert, M.A., Superintendent of the Forecast Division of the Meteorological Office. ("The People's Books.") Pp. 94. London: T. C. and E. C. Jack, 1912. *Price* 6*d.*

This little monograph can only be properly described as a masterly piece of work. Written out of the fulness of knowledge by one who is himself well known for his own original researches, the key to the whole is struck at the very outset, where the physical processes involved in atmospheric changes are discussed in the simplest possible terms. There is everywhere an appeal to these physical processes, so that the book forms a coherent whole. Considerable space is devoted to synoptic meteorology and the problems of forecasting weather by means of synoptic charts, and Mr. Lempfert is equally happy in dealing with the comparatively local problem of a "line squall" and in describing the great seasonal variations of pressure over the surface of the globe and their relation to variations in the seasonal incidence of rainfall. A short chapter deals with recent researches in the Upper Air, and it is pointed out that "the changes met with above are quite as great in magnitude and as sudden in their occurrence as those with which we are familiar at ground-level."

There is a generous supply of maps and diagrams, and we rejoice that the book is published at a price which will ensure for it a very wide circulation. It would form an admirable text-book, to be supplemented by such statistics as might be found desirable.

Portuguese Self-Taught. By E. da Cunha. Second Edition. Revised.
Norwegian Self-Taught. By C. A. Thimm. Revised and Enlarged by P. Hanssen. Fifth Edition. London: E. Marlborough and Co., 1912. *Price* 2*s.* 6*d. each.*

Both of these are new editions of books which have already proved their usefulness to travellers and others, and will be welcomed by the considerable public which is in the habit of visiting one or other of the two countries concerned.

The Syrian Goddess: being a translation of Lucian's "De Dea Syria." By Professor Herbert A. Strong, M.A., LL.D. Edited by John Garstang, M.A., D.Sc. London: Constable and Co., 1913. *Price* 4*s. net.*

This little volume is an interesting contribution to the study of Oriental religions. It contains a translation of Lucian's treatise on the Syrian goddess Astarte, by Professor Strong, with abundance of learned notes and comments by Dr. Garstang, the greatest living authority on the Hittites. To this has been

added a brief sketch of the life of Lucian with an estimate of his opportunities of forming a correct opinion of the subject of his treatise. The book will be valued by all students of ancient cults and their mysteries.

Greater Rome and Greater Britain. By Sir C. P. Lucas, K.C.B., K.C.M.G. Oxford: At the Clarendon Press, 1912. *Price 3s. 6d. net.*

This intensely interesting and most instructive essay is the work of a scholar, a student, an administrator and a statesman. It contains an exhaustive and thoughtful comparison between the Roman and the British empires, setting forth how each was acquired, held and administered, and it enlarges on how each has been affected by permanent as well as transient causes, such as space, distance, water, medical science, and the like. It contrasts the genius of Roman rule with that of Britain, showing how in the case of the former the ideal of rule was to withdraw freedom from those ruled, while in the latter the ideal is to increase freedom. The Roman empire was in the main a Mediterranean empire, "all or nearly all within the temperate zone, not concerned with lands of great cold, not concerned with the Tropics, not concerned to any appreciable extent with coloured races." But "England has overflowed into temperate zones like her own; she has found them wholly outside Europe, and very largely in the most remote part of the world, in the far south. The contrast between the Roman and the British Empires is illustrated and emphasised, if it is borne in mind that they are in the main geographically exclusive of each other." And now the British Empire is in reality two Empires, one the self-governing dominions, and the other, India, the Crown Colonies and Protectorates. It is in his wise discrimination of the methods which should be adopted for the development and administration of these two empires that Sir Charles shows his mature and skilful statesmanship. He recognises the complexities and difficulties of the many problems, which are incidental and inevitable to the work, and he states many of them with the lucidity and impartiality of the experienced administrator. He recognises that, as at present constituted, there are conflicting interests in various parts of the Empire which need the most careful handling, and may entail on the Colonial Office inconsistency in the methods of administration. He is frankly an opportunist. "The British present," he says, "has grown up on no definite plan. So far from being logical, it is a unity of contradictions, absolutely impossible on paper, but working very comfortably in fact. To anything like an orderly ground-plan of the future, British instinct, which constitutes British genius, is opposed. There is only one sure guide to the future, and that is the race instinct which represents day to day opportunism." Sir Charles comes to the conclusion that if England is to hold her own as a nation she must keep the self-governing dominions with her, and that Imperial Preference is not too high a price to pay for this: he believes it to be inevitable that in course of time, when the self-governing dominions have come to maturity, they must find outlets beyond their present boundaries, and the natural as well as the most profitable outlets are the Crown Colonies and the Protectorates. The self-governing dominions know this, and so will be most reluctant to break away from the Mother Country. This, however, is not the place for a political discussion. In conclusion, we can assure our readers that there is not a chapter in this book which is not replete with the results of wise, thoughtful, and enlightened study, presented in clear and undogmatic language which commands admiration and repays attention.

EDUCATIONAL.

Asia: A Geography Reader. By Ellsworth Huntington. Chicago: Rand McNally and Co., 1913.

This is an exceedingly interesting little book, illustrated by many photographs and some rather crude maps. Professor Huntington's detailed knowledge of the regions described enables him to add many little human touches to complete the picture. We have enjoyed especially the account of the journey by the Transcaspian Railway, with its description of the boiling samovars at the stations, surrounded by a crowd of eager passengers, each with his empty teapot ready to be filled. Teachers here will perhaps regard the American spelling as a disadvantage, otherwise the book may be warmly recommended.

A Practical and Experimental Geography. By Frederick Morrow, B.A., F.R.G.S., and Ernest Lambert, L.C.P. London: Meiklejohn and Son, 1913. *Price 2s. 6d. net.*

This book must prove very useful in such schools as devote considerable time to the so-called practical side of geography. It may be doubted, of course, whether the calculation of distances, field surveying, etc., are after all really geography. In our opinion geography proper does not commence till Chapter VII. is reached. From this point onwards the book is very good and would acquire even great ervalue if Chapter VIII. were doubled in length. The whole get-up of the volume—printing, binding, etc.—is excellent; the diagrams are simple and clear; and the explanations easy to follow. Messrs. Morrow and Lambert's book will be a formidable rival to time-honoured Simmons and Richardson, and to the more recent works by Unstead, and by Fairgrieve and Young.

A Scientific Geography. Book VIII.: South America. By Ellis W. Heaton, B.Sc., F.G.S. London: Ralph, Holland and Co., 1913. *Price 1s. net.*

This small volume completes the series of books which comprise "A Scientific Geography." Mr. Heaton's experience in writing the companion volumes has made Book VIII. the best of the series, though it is followed closely by Book II., The British Isles, and Book VII., The British Empire. Of the present volume Part II. is decidedly better than Part I., and of the separate chapters, Nos. II., IV., and VI. may be specially mentioned. The diagrams are to the point, and the maps are clear and not over-crowded with names. The most useful figures are 6, 10, 12, 13, and 18. We would wish to have had more about the Trans-Andine Railway and the Panama Canal. Further, there is, as in the other volumes of the series, a slight tendency to make too much use of the short paragraph. Connection of ideas often demands the linking up of certain paragraphs, *e.g.* on p. 14. A few minor defects, mainly linguistic, do not detract from the value of the book considered strictly geographically. For instance, the spelling of Barranquilla and Buenaventura (p. 38) should be corrected, and *contrast* (p. 40) and *series* (p. 69) should be given a singular verb.

BOOKS RECEIVED.

The Moselle. By Charles Tower. With Illustrations in colour and black and white by Lionel Edwards. Demy 8vo. Pp. x + 332. London: Constable and Co., Ltd., 1913. *Price 7s. 6d. net.*

Siam. By Pierre Loti. Translated from the French by W. P. Baines. Illustrated. Demy 8vo. Pp. xi + 182. London: T. Werner Laurie, Ltd., 1913. *Price 7s. 6d. net.*

Dent's Practical Notebooks of Regional Geography. By Horace Piggott, M.A., Ph.D., and Robert J. Finch, F.R.G.S. *Book VI.: The British Empire in America and Asia.* With a general survey of the Empire. Crown 4to. Pp. 64. London: J. M. Dent and Sons, Ltd., 1913. *Price 6d. net.*

The Framework of Union: A Comparison of Some Union Constitutions. With a Sketch of the Development of Union in Canada, Australia, and Germany, and the Text of the Constitutions of the United States, Canada, Germany, Switzerland, and Australia. Medium 8vo. Pp. viii + 207 + cxviii. Cape Town: Cape Times, Ltd., 1908.

The Log of a Rolling Stone. By Henry Arthur Broome. Illustrated from Water-colour Drawings by the Author. Demy 8vo. Pp. xv + 325. London: T. Werner Laurie, Ltd., 1913. *Price 12s. 6d. net.*

The Car Road-Book and Guide: An Encyclopædia of Motoring. With large folding road-map of England, Scotland, and Ireland. Edited by Lord Montagu. Crown 8vo. Pp. xvi + 623. London: The Car Illustrated, Ltd., 1913. *Price 12s. 6d. net.*

The Loire: The Record of a Pilgrimage from Gerbier de Jonc to St. Nazaire. By Douglas Goldring. With Illustrations in colour and black and white by A. L. Collins. Demy 8vo. Pp. xxii + 332. London: Constable and Co., Ltd., 1913. *Price 7s. 6d. net.*

With Camera and Rucksack in the Oberland and Valais. By Reginald A. Malby, F.R.P.S., F.R.H.S. With over seventy photographic studies by the Author, in colour, photogravure, and half-tone. Demy 8vo. Pp. 316. London: Headley Brothers, 1913. *Price 10s. 6d. net.*

The Elements of Geography. By Rollin D. Salisbury, Harlan H. Barrows, and Walter S. Tower. Crown 8vo. Pp. ix + 616. New York: Holt and Co., 1913.

The "Times" Shipping Number, 1912. Reprinted from the *Times*, Friday, December 13, 1912. Large 4to. Pp. xiv + 286.

The "Times" American Railway Number, 1912. Reprinted from the *Times*, Friday, June 28, 1912. Large 4to. Pp. liv + 245.

The Japanese Empire. A reprint of the *Times* Japanese edition, July 19, 1910. Large 4to. Pp. 439. London: The *Times* Office.

Maps and Survey. By Arthur R. Hinks, M.A., F.R.S. Demy 8vo. Pp. xvi + 206. Cambridge: University Press, 1913. *Price 6s. net.*

Senior Geography of North America. By G. C. Fry, M.Sc. Crown 8vo. Pp. 44. London: University Tutorial Press, Ltd., 1913. *Price 1s.*

Senior Geography of Asia. By G. C. Fry, M.Sc. Crown 8vo. Pp. 36. London: University Tutorial Press, Ltd., 1913. *Price 1s.*

The Government of South Africa. Two vols. Crown 4to. Pp. xviii + 890. South Africa: The Central News Agency, Ltd., 1908.

The New World of the South: Australia in the Making. By W. H. Fitchett, B.A., LL.D. Crown 8vo. Pp. xiv + 402. London: Smith Elder and Co., 1913. *Price 6s.*

The Argentine in the Twentieth Century. By Albert B. Martinez, Under Secretary of State, and Maurice Lewandowski, Doctor in Law. With a Map. Demy 8vo. Pp. liii + 376. London: T. Fisher Unwin, 1911. *Price 12s. 6d. net.*

Presented by the Vice-Consul for Argentina, Leith.

Trans-Himalaya: Discoveries and Adventures in Tibet. By Sven Hedin. With 156 Illustrations from Photographs, Water-colour Sketches, and Drawings by the Author, and 4 Maps. Vol. III. Demy 8vo. Pp. xv + 426. London: Macmillan and Co. Ltd., 1913. *Price* 15*s. net.*

A Busy Time in Mexico: An Unconventional Record of Mexican Incident. By Hugh B. C. Pollard. Demy 8vo. Pp. vii + 243. London: Constable and Co., 1913. *Price* 8*s.* 6*d. net.*

An Introduction to Plant Geography. By M. E. Hardy, D.Sc. ("The Oxford Geographies." Edited by A. J. Herbertson.) Crown 8vo. Pp. 192. Oxford: Clarendon Press, 1913. *Price* 2*s.* 6*d.*

Opportunities in Canada, 1913: Official Information. Furnished by the Provincial Governments and the Boards of Trade in Canada. Editors: Ernest Heaton, B.A. (Oxon.), and J. Beverley Robinson. Crown 8vo. Pp. xxvi + 366. Toronto: Heaton's Agency, 1913.

Travels in the Pyrenees: including Andorra and the Coast from Barcelona to Carcassonne. By V. C. Scott O'Connor. With four coloured Plates and 158 other Illustrations and a Map. Demy 8vo. Pp. xx + 348. London: J. Long, Ltd., 1913. *Price* 10*s.* 6*d. net.*

The Year-Book of Wireless Telegraphy and Telephony, 1913. Crown 8vo. Pp. lxxv + 563. London: St. Catherine's Press, 1913. *Price* 2*s.* 6*d. net.*

The Land of the Blue Poppy: Travels of a Naturalist in Eastern Tibet. By F. Kingdon Ward, B.A., F.R.G.S. Medium 8vo. Pp. xii + 283. Cambridge: University Press, 1913. *Price* 12*s.* 6*d. net.*

Eine Geographische Studienreise durch das Westliche Europa. Von W. Hanns, A. Rühl, H. Spethmann, H. Waldbaur. Mit einer Einleitung von W. M. Davis. Herausgegeben vom Verein der Geographen an der Universität Leipzig. Demy 8vo. Pp. iv + 75. Leipzig: B. G. Teubner, 1913. *Preis M.* 2.40.

La Géographie de l'Afrique Centrale dans l'Antiquité et au moyen âge. Par Th. Simar. Demy 8vo. Pp. 134. Bruxelles: Vromant et Cie, 1913.

Les Wangata (Tribu du Congo Belge): Etude Ethnographique. Par le Lieutenant Engels. Demy 8vo. Pp. 104. Bruxelles: Vromant et Cie, 1912.

Les Pyrénées méditerranéennes: Etude de géographie biologique. Par M. Maximilien Sorre, Professeur à l'École Normale de Montpellier, docteur ès lettres. Un vol. in-8 raisin, 41 figures dans le texte, 11 planches de phototypies et une carte en couleur *hors texte*. Pp. 508. Paris: Librairie Armand Colin. *Prix* 12 *fr.*

Le Monde Polaire. Par Otto Nordenskjöld. Traduit du Suédois par Georges Parmentier et Maurice Zimmermann. Préface du Docteur Jean Charcot. Un volume in-18 jesus, avec 30 planches de cartes et de gravures hors texte Pp. xi + 324. Paris: Librairie Armand Colin. *Prix* 5 *fr.*

Les Etats-Unis d'Amérique. Par D'Estournelles de Constant. Un volume in-16. Pp. x + 536. Paris: Librairie Armand Colin, 1913. *Prix* 5 *fr.*

La Région du Haut Tell en Tunisie: Essai de Monographie Géographique. Par Ch. Monchicourt. Un volume in-8 raisin, 14 cartes dont une en couleur hors texte, 4 figures et 12 planches de photogravures. Pp. xv + 488. Paris: Librairie Armand Colin, 1913. *Prix* 12 *fr.*

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Die Vegetation der Erde. Herausgegeben von A. Engler und O. Drude. Leipzig: Wilhelm Engelmann.

Vol. I. *Grundzüge der Pflanzenverbreitung auf der Iberischen Halbinsel.*

Von Moritz Willkomm. Mit 21 Textfiguren, 2 Heliogravüren und 2 Karten. Royal 8vo. Pp. xvi + 395. 1896. *Preis M.* 10.

Vol. II. Band i. *Grundzüge der Pflanzenverbreitung in den Karpathen.* Von F. Pax. Mit 9 Textfiguren, 3 Heliogravüren und 1 Karte. Royal 8vo. Pp. xii + 320. 1898. *Preis M.* 11.

Vol. v. *Die Heide Norddeutschlands und die sich anschliessenden Formationen in biologischer Betrachtung.* Von P. Graebner. Mit einer Karte. Royal 8vo. Pp. xii + 320. 1901. *Preis M.* 16.

Vol. x. Band ii. *Gründzüge der Pflanzenverbreitung in den Karpathen.* Von F. Pax. Mit 29 Textfiguren und 1 Karte. Royal 8vo. Pp. viii + 322. 1909. *Preis M.* 11.

Vol. xii. *Die Pflanzenwelt der Peruanischen Anden in ihren Grundzügen dargestellt.* Von Prof. Dr. A. Weberbauer. Mit 40 Vollbildern, 63 Textfiguren und 2 Karten. Royal 8vo. Pp. xii + 355. 1911. *Preis M.* 20.

Vol. xiii. *Phytogeographic Survey of North America, including Mexico, Central America, and the West Indies, together with the Evolution of North American Plant Distribution.* By John W. Harshbergen, A.B., B.S., Ph.D. With 1 Map, 18 Plates, and 32 Figures in Text. Royal 8vo. Pp. lxiv + 790. 1911. *Preis M.* 40.

Memoirs of the Geological Survey of Scotland:—Explanations of Sheets 5 (Kirkcudbrightshire); 34 (Eastern Berwickshire); 36 (Seaboard of Mid-Argyll); 45 (Oban and Dalmally); 64 (Upper Strathspey, Gaick, and the Forest of Atholl).

Memoirs of the Geological Survey of Great Britain:—Monograph on the Higher Crustacea of the Carboniferous Rocks of Scotland. By B. N. Peach, LL.D., F.R.S.

Western Australia. Selectors' Guide for 1912. Published under the direction of the Minister for Lands. Sydney, 1912.

Tours in Sweden, 1913. Railway Guide. Stockholm, 1913.

Guide-Annuaire du Gouvernement Général de Madagascar et Dépendances, 1913. Tananarive, 1913.

Census of India, 1911. Vol. xiii., North-West Frontier Province; Vol. ii., Andaman and Nicobar Islands; Vol. xvii., Central India Agency; Vol. x., Central Provinces and Berar; Vol. xiv., Punjab. Calcutta, 1912.

Diplomatic and Consular Reports.—Trade of Ichang, 1912 (5058); Trade, etc., of Hayti, 1912 (5057); Trade of Coquimbo, 1912 (5053); Trade of St. Thomas and St. Croix, 1912 (5070); Trade of Chefoo, 1912 (5071); Trade, etc., of Canary Islands, 1912 (5073); Trade, etc., of Hungary, 1912 (5074); Trade of Yucatan, 1912 (5075); Trade, etc., of Bordeaux, 1912 (5081); Trade, etc., of Norway, 1912 (5081); Trade, etc., of San Francisco, 1912 (5068); Trade, etc., of Dresden, 1912 (5072); Trade of Bahia, 1912 (5076); Trade, etc., of Brest, 1912 (5077); Trade of Batoum, 1912 (5078); Trade, etc., of Java, Sumatra, etc., 1912 (5083); Trade, etc., of Havre, 1912 (5084); Trade, etc., of Ciudad Bolivar, 1912 (5085); Trade, etc., of the Dominican Republic, 1912 (5066); Trade, etc., of Rotterdam, 1912 (5082); Trade of Shimonoseki, 1912 (5086); Trade of St. Louis, 1912 (5087); Trade of Azerbaijan, 1912 (5088); Trade, etc., of the Philippine Islands, 1912 (5089); Trade of Savannah, 1912 (5091); Trade of Germany, 1912 (5092); Trade, etc., of Philadelphia, 1912 (5090); Trade of Bushire, 1911-12 (5093); Trade of Amoy, 1912 (5094); Commerce, etc., of Dalmatia, 1912 (5069); Trade, etc., of Trieste (5079).

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THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

CEYLON IN 1913.

By A. L. Cross, F.R.C.I.

(With Illustrations.)

During a short visit to the island of Ceylon in the spring of this year I was greatly impressed with the progress made recently, and my impressions may be worth recording.

Ceylon has made enormous progress in many directions, notably in connection with what was once almost the exclusive product of Brazil—rubber. Great stretches of the low country of Ceylon, which was formerly jungle or scrub, are now covered with European plantations, mingled with the native coco-nut estates. The rubber plantations are well equipped with factories and bungalows of the most up-to-date description. Railways and roads are not far off, and the rubber can be transported to Colombo for sale locally, or shipped to London or other parts of the world direct. Millions of pounds of rubber are either sold in Colombo, or shipped direct without being sold, and the business is rapidly extending as new plantations come into bearing, which occurs after six or seven years from the time of planting. The Hevea (Para) rubber-tree is unlike any other tropical tree in that in Ceylon in January it winters. The leaves become a russet hue, and then gradually drop off, and the old trees stand under bare poles, so that it might be assumed that they were dying rapidly. But this is not so, for in a month or six weeks the new leaves begin to make their appearance, and by the end of March the trees are clothed with bright green foliage.

Tea planting succeeded coffee, which was killed out by the mysterious leaf disease, *Hemelia Vastatrix*, and is still a great industry, but tea flourishes best in the hill country at elevations of from 2000 to 7000 feet above sea-level. Strange as it may appear, the highest cultivated

tea in the world is said to be found in Ceylon on the Nuwara Eliya Tea Estates, at an elevation of from 6200 to 7000 feet, the highest estate—"Excelsior"—which I visited, running up to 7300 feet. I understand that at Darjeeling, on the borders of the Himalayas, scarcely any of the tea estates run much over 6000 feet. The tea estates in the

A coolie woman tapping a rubber-tree.

Gampola, Maskeliya, Dimbula, Nuwara Eliya and Uda Pussellawa districts are well served by both railway and road communication. The finest tea plantations in the world probably are to be seen in the Agrapatana district of the great Dimbula Valley, the true source of Ceylon's great river, the Mahavillāganga. It is a wonderful sight to look on this valley of lovely green bushes in the very highest state of cultivation, and all at an elevation of from 4500 to 5000 feet. The above named are only a portion of the tea districts. There are the

great districts of Ouvah and Haputale in the eastern province, and many others, too numerous to mention, in other parts of the island at lower elevations, but not of so much importance. Many of the tea factories turn out over 1,000,000 lbs. of tea per annum. In contrast with Assam there is no isolated life in the districts, for the estates all adjoin each

The interior of a rubber factory, where the rolling takes place. The white masses are the sheets of rolled rubber.

other, and each district possesses its own Planters' Association, with chairman and secretary, where the wants of the district are discussed. Such questions as coolie wages, medical wants, hospitals, diseases affecting tea, coco-nuts, or rubber, roads, railway transport, arrack and toddy (tadi) taverns are discussed, and action taken if necessary or feasible. These local associations are all affiliated to the parent Planters' Association, which has its permanent headquarters in Kandy, the mountain capital, and meets annually in February of each year, and sometimes

oftener, if any serious question arises. It is a great power in the country, and keeps an eye on all Government measures introduced into the Legislative Council. In fact, no measures affecting the planting community are ever passed without consultation with that body. The chairman and secretary are the most able men that can be found. The chairman often passes on to become the representative of the Rural Community in the Legislative Council, after his term of office has expired.

Each district has its sports club, with tennis, and in some cases cricket grounds, and in the districts of Kandy, Dickoya, and Nuwara Eliya golf-courses as well.

The revenue of the colony for last year (1912), according to the report of the late Governor, Sir Henry M'Callum, amounted to

A plantation bungalow on a tea and rubber estate.

£3,149,748, the largest ever attained. This year there is a probability that this amount may even be exceeded. Rubber exports have risen from 300 tons in 1907 to over 4000 tons last year (1912), and they will no doubt become a gradually increasing quantity as the young rubber plantations come into bearing.

The tea exported now averages some 186 millions of pounds. In 1881 it reached only 4000 to 5000 pounds. In the low country, however, where in recent years rubber has been interplanted with the tea, the shade cast by the rubber will render the tea not worth cultivating, and it will have to be eradicated.

Another great industry which has hitherto been, to a great extent, in the hands of the natives of Ceylon, like the cultivation of rice, is that of the coco-nut: but it is now occupying the attention of Europeans as well. There are several English companies in Ceylon engaged in this industry, and it is likely to be very profitable. The coco-nut palm in

Ceylon is practically cultivated along the west coast from Hambantota in the extreme south, to Manaar in the north-west, and also in parts of the east coast about Trincomali and Batticaloa. In visiting the Kelani Valley I was surprised to see what an immense tract of low-country land all along the Kelani Valley Railway, and inland from it, had been planted with coco-nuts, not yet in bearing, and probably not likely to be for several years to come, as the coco-nut even in favourable situations takes seven or eight years to come into bearing.

The great harbour of Trincomali has practically been abandoned as a naval station, and the buildings long occupied by the naval authorities, some artillery, and a detachment of the regiment garrisoning Ceylon,

A street in Colombo.

have been allowed to fall into disrepair. This seems decidedly retrograde, as now that a motor service has been established in connection with the northern railway from Anuradhapura to Trincomali there was the less necessity for abandoning this splendid naval harbour. Colombo is, of course, the seat of Government, and a great harbour, where the largest mail and other steamers of all nations call, and where all the shipping of produce takes place.

The great scheme for uniting Ceylon to India, which took shape some years ago in Mr. Joseph Chamberlain's time as Colonial Secretary of State, is now almost a *fait accompli*. The northern railway, which runs to Jaffna in the extreme north of Ceylon, was completed some five years ago, and the branch line to Manaar to connect with Adam's Bridge and India, some thirty-five miles in length, is expected to be opened in

August or September, communication with India being carried on by steam ferry till such time as the bridges and causeways across the islands are finished. The Indian Government has already constructed their portion of the line as far as the island of Ramesweram (celebrated for its Hindu temple), to connect with the Ceylon railway system, so that in the near future one may travel by rail from Colombo to Quetta without a break. This is no mere stretch of imagination, but will soon be an accomplished fact.

Everywhere throughout Ceylon there are marks of great prosperity. The natives are building better houses in the coco-nut districts.

The golf-course at Nuwara Eliya.

Wealthy natives are buying up all the house property in Colombo, and even in the sanitarium—Nuwara Eliya—it is quite the fashion among them to seek the higher regions in the hot-weather season. Colombo is a place of 200,000 inhabitants, and has many fine buildings. The Galle Face Hotel and the Grand Oriental are palatial buildings, with dining-rooms of 120 by 40 feet, and they can accommodate hundreds of passengers. When a big P. and O. mail steamer comes in, on the way to or from Australia, she will probably land 400 to 500 passengers; and others, German, French, or Bibby liners, in proportion.

Nuwara Eliya, 6200 feet above sea level, has railway communication with Colombo all the way. It has grown considerably within the last few years, and is still growing. There is a beautiful public park along

the banks of the Nanuoya stream, a good racecourse and polo grounds, a large building called the United Club, with reading-room and library and assembly rooms, large tennis-courts and croquet-ground, and a nine hole golf-course for ladies. There is a full eighteen-hole course for men of a very sporting character, the Nanuoya river having to be crossed some eight times. There is a beautiful artificial lake some three miles in circumference, made by placing a bund across the Nanuoya where it leaves the Nuwara plain, which is stocked with carp and trout, though the latter stick more to the river. There are also miles of fine driving roads round the lake and Moon Plains, and to the Ramboda Pass, and a road and light railway to the beautiful tea district of Uda Pussellawa. On the Badulla road to the eastern province, about six miles from Nuwara Eliya, are the beautiful Government gardens of Hakgalla, well worth a visit, especially to botanists.

The Galle Face Drive in Colombo, with the military barracks in the background.

For any one desirous of having a panorama of the mountain system of Ceylon, there is nothing finer than the view from the top of Pedrotallagalla on a fine day in March. Though this mountain is 8300 feet above sea-level, it is only 2100 feet above Nuwara Eliya, and the path being good and sheltered by the jungle very nearly to the top, it can be ascended in a little over an hour or so. The writer was favoured with a splendid day, and from the top the whole main mountain system of the island, from Adam's Peak in the south-west right round to Pedro again, was distinctly

visible. Outside the mountains there was a complete circle of snow-white clouds, like gigantic fleeces, but each separate from the other, and perfectly still, as there was no wind to move them.

Though there are practically no unexplored parts of Ceylon now, there are many great stretches of country covered with forest or scrub where wild elephants and other animals, such as deer and buffalo, roam about. These parts are seldom visited except by hunting expeditions. Wild elephants, however, unless rogues, cannot be shot without a licence from the Government.

The ancient fresh-water tanks in the neighbourhood of Anuradhapura and Polonnaruwa owe their origin to the old Buddhist kings of Ceylon.

Coco-nut trees on the seashore. The photo was taken during the monsoon.

Some of them were constructed 500 and 400 B.C., others 400 A.D. Many of them have been restored, but the land underneath them is not as much used by the Sinhalese inhabitants as it might be. Some of these old tanks were twenty and forty miles in circumference, with enormous long bunds. The Kalawewa tank, constructed A.D. 437, had a bund of solid stone twelve miles in length which remains to this day, and forms what Turnour designates as "perhaps one of the most stupendous monuments of misapplied human labour in the island." The so-called "buried cities,"—buried, that is to say, under forest trees—of Anuradhapura and Polonnaruwa, in existence about the time when these tanks were constructed, have been partly freed from the dense jungle that has covered them, and many interesting ruins laid bare. The Anuradhapura pagodas look in the distance like islands standing out of

a level sea of jungle. Eight miles from Anuradhapura is a hill called Mihintale, covered with ruined small pagodas, and a tank. It is said that the Buddhist religion was first proclaimed from this hill long before the Christian era. The *Mahawanso*, discovered by George Turnour of the Ceylon civil service in 1826, and translated by him, gives a history of Ceylon for twenty-three centuries, from 543 B.C. to 1758 A.D., "presenting a connected history of the island itself" from these remote centuries. From this wonderful hill Mihintale there is a splendid view of the surrounding country, all forest, with open glades and tanks, stretching as far as the eye can reach in every direction. No doubt some day this fine country will be available for cotton and other kinds of tropical cultivation. Meantime it is only used for the rearing of great herds of red cattle to feed the towns of Ceylon and the planting districts.

Ceylon is a most interesting country, and the wilder parts may still repay the enterprising traveller who does not mind roughing it. There is plenty of scope on the east coast from Trincomali to Point Pedro in the extreme north for such investigations, if carried out in the healthy season, from the middle of February to the middle of April. At other times it is apt to be malarious.

THE TENTH INTERNATIONAL GEOGRAPHICAL CONGRESS.

THE much postponed Tenth International Geographical Congress was opened at Rome on the morning of March 27. The opening ceremony, which was graced by the presence of the King of Italy, took place in the Sala degli Orazi e Curiazi in the Palazzo dei Conservatori, on the Campidoglio, and was of an impressive nature. The Mayor of Rome, Signor Nathan, welcomed the Congress in the name of the city, and was followed by the president of the Congress, the Marchese Raffaele Cappelli, who is also president of the Royal Italian Geographical Society. He delivered a speech of much eloquence, in the course of which he spoke of the last International Geographical Congress held in Italy, that of Venice in 1881. He also noted that at the Geneva Congress the president, the late Dr. Arthur de Claparède, announced that Peary had just prior to the Congress set out on his journey to the North Pole. Admiral Peary was present at the Roman Congress with all the honours of his success, and since the previous Congress the South Pole has also been conquered.

The Marchese was followed by the Minister of Public Instruction, who, in the name of the King, formally declared the Congress open. On behalf of the delegates Professor Otto Nordenskiöld returned thanks for the speeches of welcome, and the meeting, which was quite a short one, closed. Most of the members of the audience grouped themselves round the entrance to see the picturesque departure of the King from Michelangelo's beautiful piazza in the spring sunshine, and then the

strangers betook themselves for the most part to the museums of the Campidoglio. The Congress tickets gave right of free access to all the museums and collections belonging to the city, and this great privilege undoubtedly proved a temptation to many of the members, who found Rome's treasures, ancient and mediæval, more attractive than the meetings of the sections at least. This is perhaps a necessary consequence of the choosing of so attractive a city as Rome for the Congress, but its effect was the more to be regretted in that the total number of participants was small. The list of members and associates present published on March 28 only contains some three hundred names in all, of which only two hundred were members, and though later lists added nearly a hundred more the total was never large, and the attendance at the meetings of sections was frequently reduced to a minimum. Indeed, it soon became necessary to hold joint sectional meetings owing to the small afternoon attendance.

The small attendance was no doubt partially due to the double postponement, and especially to the fact that the original postponement took place so short a time before the proposed meeting in October 1911. Further, it was unfortunate that the highly successful International Zoological Congress at Monaco should have overlapped the Geographical Congress by a day or two, for this no doubt further reduced the number of members. Whatever the cause it was noticeable that, as compared with Geneva, the number of British members was very small, and of these the majority were from Scotland.

The real business of the Congress began on Friday, March 28, the meetings being held in the University, a centrally-situated building well fitted for the purpose. The office arrangements proved very good, and the excellent *Diario*, which appeared promptly every morning, contained —a most useful innovation—a short account of the proceedings of the previous day. The Geographical Society also, together with various other geographical bodies, offered to the members and associates a large amount of valuable literature, including some very useful maps, and the Istituto Geografico de' Agostini supplied every one with their handy little guide to Rome, with its excellent plans. Various invitations to visit exhibitions, institutions, etc., also reached the members.

Sunday was devoted to the excursions offered by the Organising Committee. These tended to be archæological rather than geographical in the strict sense, and even that which was most strictly geographical, the visit to the Alban Hills and Lake Nemi, was a little disappointing from this aspect in that opportunities for observation were very limited, no expert guidance was provided, and generally of geography in the strict sense there was but little. Regarded as a pleasure excursion, however, the day was a great success, and those who were present will not soon forget the beauty of the blue anemones which clothed the banks of the lovely lake.

Of the entertainments mention may be made especially of the reception given by the town in the palace of the Campidoglio.

Meetings were held from Friday, March 28, to Thursday, April 3, and on Friday the long excursions began. These included expeditions

both to the north of Italy (Po valley, etc.) and also to the south, to Naples and Sicily.

Some account of the proceedings at the meetings may now be given.

At the first general meeting, which, as already stated, took place on Friday morning, March 28, in addition to various minor pieces of business, three papers were read. These were first one, copiously illustrated by lantern slides and maps, by Dr. L. von Loczy of Budapest, on the survey of Lake Balaton in Hungary. Dr. von Loczy himself initiated this survey some twenty years ago, and, as the readers of this *Magazine* know, the results have been appearing for many years in the form of elaborate monographs. The interest of the lake lies in its large area and its shallowness, and the variety of types of scenery, depending upon variations in the surface rocks, which appear upon its banks.

Dr. von Loczy was followed by Dr. C. van Overbergh of Brussels, whose paper was entitled "Human Geography." It was, however, devoted to some account of the work of the International Institute at Brussels, which has undertaken a very elaborate study of the negro race, having collected together four hundred thousand references in regard to this race. The material so collected has been most elaborately classified and arranged, with the result that information on practically any point connected with the black races can be furnished to inquirers. The task has involved the collaboration of six hundred persons, and has taken seven years. If a similar bibliography could be compiled for other races a veritable encyclopædia of human and social geography would be constructed. In the course of his address Dr. van Overbergh made frequent allusion to the work of the International Institute of Agriculture at Rome, an institution which the members had later an opportunity of visiting, and expressed the wish that the Brussels Institute might evolve along similar lines, and be of similar utility to the world.

Dr. O. J. Skattum then gave an account of the Norwegian explorations in Spitsbergen, especially from the point of view of geology. The paper was illustrated by a fine series of lantern views.

The proceedings closed with the formal presentation of reports upon the progress of geography in the different countries of Europe, since 1889. The report for Scotland will be published here at a later date.

The sectional meetings in the afternoon were mostly somewhat sparsely attended, and a number of papers on the programme of the different sections were not read owing to the absence of the authors. Most interest perhaps attaches to the proceedings of Section VIII. (Methodology), where representatives of the different countries presented reports on the state of geographical teaching in their respective countries, that for England being presented by Mr. F. Grant Ogilvie. The speakers for the most part confined themselves to a short summary of their reports, and the publication of the complete papers in the *Proceedings* of the Congress will be looked forward to with interest.

Another interesting paper was one by Professor Descombes (Section III.) on the work of the "Association Centrale pour l'Aménagement des Montagnes." The Association has its seat at Bordeaux, and has for

objects the afforestation of mountain regions, the prevention of excessive grazing, the regulation of mountain torrents, and so forth. The association has already done excellent work in the Pyrenees. General Schokalsky gave an account (Section IIA.) of the work done by the officers of the Russian Navy in studying the Russian seas, and presented hydrographical maps of the Arctic Ocean, the Baltic, the Black Sea, the Caspian, and the northern Pacific. In the Economic section (V.) Professor Zimmerer of Regensburg read a paper on the Danube as a commercial highway, and showed that commerce along this stream has been carried on uninterruptedly for a very prolonged period.

On Saturday, March 29, the greater part of the General Meeting was devoted to a discussion of the 1 : 1,000,000 map of the World. The proceedings opened with a paper by Colonel Close, who briefly summarised the steps which had been taken in connection with this map since the Geneva Congress. The substance of this paper has been already reported here. Colonel Close was followed by Colonel Shidzouma, delegate of the Japanese Government, who recalled the fact that in November 1909 it had been resolved that the maps of Asia and China should be undertaken by France and Germany. Subsequently, however, Japan joined the Convention in charge of the map, and as she has had in preparation for a number of years a map of eastern China, on the 1 : 1,000,000 scale, which, with little alteration, could be made to conform to the International regulations, she desires that at least a part of the map of this region should be confided to her. A number of other speakers followed, and in the course of their remarks it became apparent that a number of minor points in regard to the map still remain unsettled, or open to criticism. It was therefore proposed by Professor Penck that a new International Official Conference should be held to examine the sheets already published, and decide whether any modification of the previous resolutions had become necessary.

After the close of this discussion Professor Lallemand read a paper on a new International map on the scale of 1 : 200,000 for aviators. He discussed in a very interesting fashion the aviator's difficulty in orienting himself, and also the kind of information which an aeronautical map should contain. The Aero Club of France has already published a dozen sheets of an aviator's map of Central France, which has proved very useful. Professor Lallemand concluded by proposing that a new International Conference should be arranged for the purpose of settling upon the desirable symbols for an aeronautical map on the 1 : 200,000 scale, to be based upon the 1 : 1,000,000 map.

The session concluded with a paper by Professor Helbronner on his survey work in the French Alps. He has carried on this survey for ten years, and the first instalment of his results has appeared as vol. i. of a work entitled *Description Géometrique détaillée des Alpes françaises.*

In the sectional meetings in the afternoon an interesting paper was read by Professor von Cholnoky on the influence of the Asiatic monsoons on the climate of Europe (Sections II. and VI. united). Apparently a lowering of temperature of one degree at the beginning of June, which occurs from Sweden through Germany to the Balkan States, is due to

the effect of the monsoons. In speaking on this paper Professor Woeikof pointed out that both meteorologically and climatologically Europe can be regarded as a peninsula of Asia.

Professor Sapper spoke (same Sections) of "Bodenflüsse," that is, of those masses of earth which owing to their water-content are capable of movement, and of spreading out upon the lower grounds. Such earth streams occur in the tropics, in temperate latitudes, and in polar regions, and have great influence upon topography. The paper gave rise to an interesting discussion in which Professor Supan took part. In Section VIII. Captain Giannitrapani proposed that the 1 : 1,000,000 map be supplemented by the issue of a Universal Geography, and that the International Commission for that map should draw up a scheme for its execution, this scheme to be presented to the next Congress.

The General Meeting on the morning of Monday, March 31, was a brief one, as the session was interrupted at half past ten to permit the members to take advantage of the Marchese Raffaele Capelli's invitation to visit the International Institute of Agriculture. The meeting was, however, rendered interesting by the appearance of Admiral Peary, who was very warmly received by the members, and, at the invitation of the president, took his seat on the platform, and spoke a few words of thanks.

Professor Emile Chaix opened the proceedings by a short account of the *Atlas of Erosion*, which, as readers of this *Magazine* already know, has made much progress, and promises to be an extremely fine and very useful work. Professor Oberhummer then spoke on the question of the reproduction of ancient maps. He pointed out that many of the existing reproductions were made before mechanical methods had reached their present state of advancement, and that they do not satisfy the needs of students. He regarded it as unlikely that governments could be induced to take up the matter, but much might be done by the geographical societies of the different countries. The question aroused considerable interest, and the discussion was ultimately referred to Section VII., which, in the afternoon, accepted a resolution that a Commission should be formed to draw up a catalogue of the ancient maps in the various countries of the world.

The General Meeting was resumed in the afternoon, when General Schokalsky read an interesting paper on Russian investigations during the last fifteen years in the Arctic Ocean. He was followed by Mr. Stefansson, who gave an illustrated address on his explorations in Arctic America, the pictures, especially of Eskimo life, being very attractive.

No outstanding papers were read in the afternoon before the Sections, the chief incident of the afternoon being a private meeting of delegates of the different countries interested in the production of the 1 : 1,000,000 map. After discussion the following resolutions were passed at this meeting :—

(1) "It is desirable that another official Conference should be held to consider questions affecting the International Map of the World on the scale of 1 : 1,000,000, in the capital of a State which has already undertaken the preparation of sheets of the map ; and it is thought that it would be convenient to all concerned if this capital were Paris."

(2) "In view of the fact that the general principles governing the construction of the map are already settled and adopted, the new Conference would be asked to consider questions of detail only, such as the size of the lettering, conventional signs for railways, etc."

(3) "It is desirable that all civilised States should be invited to send delegates to the proposed Conference."

(4) "It would be convenient if the date of the proposed Conference were towards the end of the present year."

(5) "London (Geographical Section of the General Staff, War Office) remains the centre of the undertaking until the meeting of the proposed Conference, and communications connected with the proposed map should be addressed to that office. Also it is desirable that a set of not less than fifty copies of a sheet already printed should be sent by each country which has produced a sheet or sheets to the above office at an early date. These sheets will be distributed to those Governments invited to take part in the new Conference, and to recognised private authorities."

In the morning session on April 1, M. Semenow-Tianchanskij opened the proceedings with a paper on a proposed "Index nominum geographicorum universalis." Such a work should, he thought, be undertaken by the great geographical societies of the world, and should be followed by periodical supplements, containing additions and corrections. It should be published at so cheap a rate as to ensure its maximum circulation.

Professor Schott of Hamburg, and Commander Drechsel, General Secretary of the International Committee for the Exploration of the Sea, both spoke on various problems connected with investigations in the Atlantic, a subject which was the subject of one of the resolutions of the Geneva Congress. After their speeches the two members united in presenting the following resolution, which was accepted:—

"The Tenth International Congress of Geography recommends:—

"(1) That, in accordance with the decision arrived at by the Geneva Congress (1908), and the meeting of the Monaco Commission (1910), the first problem for the international exploration of the Atlantic be regarded as the sending out of preliminary expeditions to the North Atlantic to investigate the amount, extension in space, and nature of the periodic variations in the layers of water down to a depth of 100 metres, and the determination of the extent to which a single observation represents the mean condition of the great depths.

"(2) That at the same time the observations on the temperature and salinity of the surface, which have been already carried out for many years by the different nations, should be continued on a larger scale, and that the Congress also recommends that floats in large number should be liberated in order to study the ocean currents.

"(3) That the President of the Congress be requested to communicate this resolution to the Governments of the States interested in navigation and in fishing in the North Atlantic, and particularly to those States which are at present united for the International Exploration of the Sea, in order that they may consider whether the above directions can be carried out."

Professor Ole Olufsen then spoke of the labours of the Committee appointed at Geneva with the object of attempting to obtain a closer union between the chief geographical societies of the world. As yet not much has been done in this direction, and he suggested that the Congress should express the desire that the secretaries of the chief geographical societies of the world should meet in Copenhagen not later than 1914, in order to consider the matter.

Mr. Bridgman of New York then spoke of Peary's Arctic work, illustrating by some fine lantern slides, and was followed by Commander Roncagli, the general secretary of the Congress, who spoke on Peary's observations for latitude. The session closed after some minor business.

The most interesting papers in the afternoon sections were those by M. de Quervain (Sections II. and VI. united) on his crossing of Greenland in 1912, and by Professor Nordenskiöld on the Inland Ice of the Arctic and Antarctic regions. Professor Nordenskiöld stated that inland ice only occurs in continental regions with a polar climate. The exceptions, *i.e.* the inland ice of South Greenland, are to be explained as the result of an earlier period of greater cold.

In the morning session on April 2, Dr. W. S. Bruce gave a full account, illustrated by lantern slides, of the proposed second Scottish Antarctic Expedition. The project was subsequently warmly supported by Admiral Peary, by Mr. G. G. Chisholm on behalf of the Royal Scottish Geographical Society, and by Professor Penck. Subsequently Mr. Stefansson described the plans of the Canadian Arctic Expedition, to which frequent reference has already been made here. Admiral Peary and Dr. Bruce congratulated Mr. Stefansson on having obtained the support of the Canadian Government, and expressed warm approval of the details of the expedition.

After the transaction of various minor pieces of business, Professor Ricchieri of Milan spoke of the labours of the Committee on the question of the transcription of geographical names. The subject is recognised on all sides as a very difficult one, and after a discussion in which a number of delegates took part, it was resolved that the question of how best to obtain a uniform method of writing and pronouncing geographical names should be referred to the new Conference which is to meet in connection with the map of 1 : 1,000,000.

In the sections the most interesting paper was one by Professor Supan on the Europe of geographers (Section VI.). As at present defined, he considers that Europe is neither a peninsula of Asia nor an independent entity. It is a purely historical concept with no true geographical value. If, however, Russia be regarded as a part of Asia, then the remainder of Europe is a true peninsula, whose morphological characters are in striking contrast with those of Asia. The point is of considerable interest, for it is another indication of the fact which we have frequently emphasised here lately, that the new geography will have to discard, sooner or later, the nomenclature which an earlier geography imposed upon it. The immediate problem, however, is when will teachers be bold enough to discard this outworn terminology? Must they, for example,

always continue to define Europe and then explain that the name has no geographical value?

On Thursday morning the delegates met to consider the next place of meeting, the question of adding Spanish to the official languages of the Congress, and the resolutions proposed during the meeting.

As regards the first point it was unanimously agreed that the next Congress should be held at St. Petersburg in 1916.

The second point gave rise to a lively discussion, but when General Schokalsky asked if, supposing Spanish to be accepted as an official language, Russian would similarly be accepted, the proposal was doomed, and was finally withdrawn.

All the resolutions submitted to the delegates were accepted, with only minor alterations. Most of these have been already mentioned, but for convenience' sake, they may be summed up as follows:—

(1) Professor Lallemand's resolution in regard to an international aeronautical map (see p. 408).

(2) Resolution in regard to the 1 : 1,000,000 map (see p. 409).

(3) A recommendation in regard to the Atlas of Terrestrial Relief (see p. 409).

(4) Commander Drechsel and Professor Schott's resolution in regard to the study of the North Atlantic (see p. 410).

(5) Professor Olufsen's proposal in regard to measures to be taken to form a world-wide Union of Geographical Societies (see p. 411).

(6) A motion by General Schokalsky emphasising the necessity that maps accompanying scientific memoirs, as well as isolated maps, should always show the scale, the projection used, and the source of the information utilised. This is a reaffirmation of a recommendation adopted at Berlin in 1899.

(7) The proposal that the International Conference for the map of the world should consider the question of the unification of geographical nomenclature (see p. 411).

(8) Professor Oberhummer's proposal that a committee should be appointed to further the reproduction of ancient maps, and to prepare catalogues of the ancient maps hitherto reproduced, these catalogues to be published before the next Congress.

(9) A resolution by Dr. Erödi on questions connected with geographical teaching, which included a recommendation that the history of geographical discovery should be included in the teaching of geography; that geographical excursions to foreign countries should be arranged for the pupils of higher schools; that summer courses in geography should be arranged; and that an International Geographical Institute should be established.

(10) A resolution proposed by M. Helbronner that a commission should be appointed to settle disputed questions of nomenclature along mountain frontiers, and especially to attempt to get rid of duplicate names.

(11) Captain Giannitrapani's resolution in regard to the drawing up of an official universal geography (see p. 409).

In the afternoon the closing meeting was held, and put an end to a successful if not largely attended Congress.

THE ARMENIANS OR HAIKANS: AN ETHNOGRAPHICAL SKETCH.

By V. Dingelstedt, Corresponding Member, Royal Scottish Geographical Society.

Armenians are one of the very few old nations, who, having lost their autonomy, being deprived of their national rights, crushed by centuries of oppression, have yet preserved their individuality, their national creed, their customs and habits, their patriotism and their belief in a national resurrection. Though dispersed all over the earth, a considerable number of them still occupy their fatherland, a beautiful, fertile and healthy mountainous country, a high plateau (Hayasduni or Haikh) strewn with the ruins of their ancient cities, commanding an important strategical position in connection with intercommunication between the central plateau of Asia and Anatolia, and including in its frontier the origin of four famous historical rivers: the Kur with the Aras, the Tigris and the Euphrates.

Armenians have serious claims to the attention of geographers. They have had a glorious history, and have their own national character, their peculiar feelings and traditions, their own mental characteristics, creed, moral habits and usages, which enrich humanity and are particularly interesting on account of their ancient origin. It has not always been big nations, but sometimes small ones, such as the Etruscans, Greeks, Jews, etc., who have made the biggest contribution to human enlightenment. The Armenians are not Greeks, nor has their native country any resemblance to Hellas, yet they have also solid if not brilliant virtues.

The acceptance of Christian doctrines condemned as heresies by other Christian nations has greatly influenced the destiny of Armenians, excluding them from the benefit of religious intercourse. Even in our enlightened times they are not regarded as true Christians deserving full protection from intolerance and persecution. The repudiation of the Armenians as a true Christian nation has had an effect analogous to the condemnation of the Jews as enemies of Christ: the two people become thus associated, not indeed as friends, but as rivals condemned to seek in money the means to fight against the injustices of the world.

There is a resemblance and not improbably a blood parentage between Armenians and Jews. This idea was first announced by F. v. Luschow who, in his *Ethnological Studies*, reached the conclusion that both nations are descended from the old Hittites or Khita (Hethæens) mentioned in the history of Rameses II., on the monuments of Egypt, as having founded before the Phœnicians a powerful empire in Asia Minor. A little later another German ethnologist, L. Sofer, came to the same conclusion.[1]

[1] "Armenien und Juden." *Zeitschrift Demogr. Stat. Juden.* 1907.

Both nations have the same commercial acumen, the same greed for gold, the same characteristic elongated features, with a well developed, prominent nose, black hair, and heavy yet often handsome physiognomies. Armenians are not an heroic, perhaps not even a chivalrous nation, heroism and chivalry having been lost in long subjection to foreign rule, but they are not without many civic and manly virtues. Intelligent, industrious, hard-working, persevering, greedy, shrewd, cunning, sordid, hard-hearted, fond of knowledge, inquisitive, insinuating—they are the Jews of the East.

But though an Oriental nation they are capable of being inoculated with Occidental civilisation, for in this race are mingled many Eastern and Western vices and virtues. In their Oriental soul there are admirable resources of patience. An Armenian understands almost equally well Oriental and Occidental man—whence their superiority as business men. It is through such a race of men that a reconciliation between Eastern and Western ideas and mode of life may be attained.

Armenians are mainly known to the general public by the appalling and frequent massacres perpetrated on them under the auspices of the Turkish Government. Being generally of a peaceful character, Armenians submit to oppression, but they are yet capable of energetic action when roused to high indignation by the iniquities of their foes, and when called upon to defend the honour of their wives. A peaceful peasant, merchant or citizen may then suddenly turn into a terrible bloodthirsty *bandit*, animated with a blind fury of revenge and not stopping before even the most cruel deeds. Yet, during centuries of oppression, they have lost the martial virtues which play such a vital part in the health and honour of a free nation.

Geographical Description.—Armenia (Hayasduni or Haikh) is an extensive country of Western Asia, extending from the Caucasus in the north to the mountains of Kurdistan in the south, from the Caspian Sea in the east to Asia Minor in the west. There were two Armenias—major and minor. Armenia major—Medz Hayotz,—or Armenia proper, to the east of the Euphrates, is an elevated tableland, about 7000 feet in height, culminating in the peaks of Ararat and sinking towards the plains of Iran and the valley of the Aras on the east and south, and to those of Asia Minor in the west, while Armenia minor (Phokhr Hayotz) extends to the west of the Euphrates.

Armenia proper is traversed by many mountains, some of which are of volcanic origin; it is broken by glens and valleys, and contains within its borders the sources of mighty rivers—the Euphrates, Tigris, Aras, Kur—and a great number of lakes—Van or Aghtamar (3690 square miles), Sevanga or Khabodan (1280 square miles), Urmia or Vieyhem.

West of Ararat, along the Russo-Turkish frontier, extends a high chain separating the Aras from the Murad (the Eastern Euphrates), called the *Aghri Dagh*. It extends towards Erzerum, where it joins the high (water-parting) ridge separating the river-basins of the Black Sea, the Caspian and the Persian Gulf. Towards the sources of the Aras the chain rises to an altitude of 3600 metres, and is called Bingol Dagh. Hence radiate the mountain chains which separate the waters

of the Murad from the Kara-su, the two uniting somewhat farther south to form the Euphrates. In consequence of the irregular topographical character of this country some Armenian authors have found an analogy between the tormented course of their national history and the tormented character of their national soil. The mean altitude of the Armenian plateau is 1500 metres.

The volcanic mountains of Ararat—Arm. *Masis*—(16,925 feet) have an imposing aspect; they enjoy in the eyes of Armenians a sacred character and constitute a centre of their patriotic affection. Armenia enjoys a healthy but, in winter, rather a cold climate, and has luxuriant pastures, romantic scenery and a naturally fertile soil, producing grain, tobacco, grapes, cotton, rice, ricinus, hemp, etc. Unluckily law and order scarcely exist, wars and troubles are frequent, and consequently there are numerous ruins of once flourishing and important towns, such as Armavir to the north of Ararat, Artaxata, Ervandashat, Pakharij, Varzahan, Ani and others.

The Armenian mountains are treeless, showing only rocks and vast pasturage, and the inhabitants use as fuel dry cow-dung mixed with chopped straw.

A description of the geographical features of the high plateau of Greater Armenia, enclosed in the quadrilateral Erzerum, Mush, Bashkala and Bayazid, and now called Turkish Armenia, has been given in this *Magazine* by Captain F. R. Maunsell.[1] With the actual and promised extensions of the railway, the Armenian plateau will certainly attract before long the attention of the ruling nations. It is situated within an area which opens on the south-east to the Persian Gulf: on the west it has access to the Mediterranean, on the north to the Black Sea, and on the north-east it commands the Caspian and the routes of Northern Persia.

Religion.—Creed, language and traditions of past woes and glories are the triple ties which, besides the otherwise powerful natural ties of racial unity, bind together the people of Haikh.

Like the Jews, the Armenians are an ancient nation at whose birth a creed presided. Their religious organisation has survived their national independence and political ruin, and it is mainly thanks to its faith that the Armenian nation, though persecuted, dispersed and brought under foreign yoke, has continued to maintain itself through centuries, and still exercises a not quite negligible importance in the industrial and commercial movement of the world. The great majority of Armenians continue to belong to the Gregorian Church. About a quarter of them have retired from this church, and under the name of Armenians-United have become adherents of Roman Catholicism. They call themselves Catholics, and are divided into two groups, a majority recognising the Pope as its chief, and a minority forming "Old Catholics." A not inconsiderable number of Armenians have also become Lutherans, and some are Greek-Armenians. Considerations of safety or some material advantage have caused a considerable number

[1] Vol. xii. p. 225.

of Armenians in Turkey and Persia to become Mussulmans. The Armenian Church claims an older than apostolic foundation: for according to legend this Church was already founded in 34 A.D. The historical founder was, however, St. Gregory, called the Illuminator, who was the first Armenian bishop (302 A.D.).

Armenians have adopted the teaching of Arius, the founder of Arianism, according to which Christ was a mere creature and a work of the deity, not of the same substance with the Father. These doctrines were condemned at the Council of Nicæa in Bithynia (325 A.D.). Arianism was virtually abolished in the Roman Empire about 379-395, and has gradually lapsed into Unitarianism.

The Armeno-Gregorian Church has maintained a strong ecclesiastical organisation. The supreme chief of the Church is a catholicos (at present Mattheos II.) residing in Etchmiadzin, a little trans-Caucasian town at the foot of Ararat. His humble palace is far from having the splendour of the Vatican, but he bears the pompous title of "His Holiness the supreme Patriarch and Catholicos of all Armenians." He is chosen by a council consisting of two delegates from each of the eparchies, directly depending upon the catholicos, eight members of the synod of Etchmiadzin, and seven delegates from the congregation of Etchmiadzin. He is confirmed in his powers by the decree of the Emperor of Russia, who has his very powerful "procureur" in the synod. There are eight eparchies directly depending upon the catholicos: six of them are in Russia, viz.: that of Erivan, comprising within its jurisdiction the towns and the districts of Erivan, Kars, Alexandropol, Nakhidjevan, Kagisman and Olty. Almost one-half of the Russian Armenians belong to this bishopric: the other five are those of Tiflis, Shusha, Shemakha, Astrakhan and Kicheneff (Bessarabia). The two eparchies directly depending on the catholicos outside Russia are that of Azerbeidjan, with its centre of Tabriz, and that of Nor Djoulfa, near Ispahan, its jurisdiction extending to South-Persia, India and the Indian archipelago.

There are forty-five Armenian eparchies in Turkey, under the superior guidance of the Patriarch in Constantinople who governs through a mixed ecclesiastical and lay assembly, called the National Armenian-Assembly. There are besides three high ecclesiastical dignitaries: a patriarch in Jerusalem, whose jurisdiction extends to the Armenians of Syria and Cyprus; a catholicos at Sis, who is hierarchically second to the catholicos of Etchmiadzin; he ordains his own bishops and bears the title of "*Catholicos de la Maison de Cilicie*"; a catholicos of Akthamar, residing in the isle of this name in the lake of Van, and governing the mountains of Kurdistan. Outside Turkey there is an eparchy in Egypt, and another in Bulgaria, governing the Austrian and Rumanian Armenians. In the United States there is an Armenian bishop of Worcester.

The Armenians do not keep up their churches with much care, and in everyday life they are far from being devout. Their churches and monasteries have mostly their own glebes, cultivated lands, vineyards, orchards, gardens, shops, droves of cattle, flocks of sheep, etc.

They let their lands to peasants, undertake commerce and work to increase their worldly goods. To most of the temples and monasteries are attached schools. Armenians have many saints, mostly among ancient patriarchs. They like making pilgrimages to the tombs of these saints, to monasteries famous for some "miraculous" image and to some tumulus or stone or tree which has become sacred in the eyes of superstitious people. Those objects are sometimes equally venerated both by Armenians and Turks, some former Christian sanctuaries having become Turkish.

Tree worship exists at Tzugrut, near Akhaltsikh: pilgrimages towards the sacred tree are organised, wax tapers are lighted, incense burned, small animals sacrificed, and prayers said. The tree is placed under the safeguard of the public. Sick persons tear off rags from their garments, and attach them to the tree, believing that they can thus get rid of their complaint.

Armenians worship old temples in ruins, as also ancient MS. Both form objects of pilgrimages and religious practices. In some places they also worship serpents. Armenian peasants do not kill serpents found in a house: these are home serpents and bring fortune to the house. In Artvin, the power of curing some diseases is attributed to the serpent. There are black and white serpents, regarded as good and evil. Epileptic women (called [illegible]) are considered by the people as being struck by some saint, and they then regard themselves as servants of this saint. In the popular feasts one may see these women prostrated in ecstasy before church doors, sacred trees or rocks, and articulating some mandates of the saint. That occurs mainly in time of some popular calamity.[1]

Numbers.—According to Colonel Mark Bell, there are about four million Armenians,[2] that is a little more than Swiss (3,741,971). Probably more than half of them are actually in Russia, one quarter in Turkey, some hundred thousands in Persia, some thousands in Austria-Hungary, and the rest scattered from the Gulf of Iskandarun to Lake Urmia, over Austria, the Balkan States, India, etc.

More than half of the Russian Armenians are in Transcaucasus. They were formerly more numerous in Turkey, but the terrible reign of Abdul Hamid forced many of them to leave the country. Armenians are known in most of European great cities, and their numbers are rapidly increasing, their women being prolific.

Armenians yield a variety of types. The purest type is to be found in the province of Astrakhan: the people here are tall, well-built, but inclined to obesity. They have large, black, deeply set eyes, their forehead is low, the nose of great length, prominent and aquiline: the oval of the face is even longer than that of the Persians. All Armenians are brachycephalic, their cephalic index, according to Khanikov, being about 85. The beard is abundant and of precocious development: one may meet in the streets of Tiflis boys of 13-14 already bearded.

[1] Fr Macler, *Rapport sur une mission scientifique*. Paris, 1900.
[2] *S.G.M.*, vol. 1890.

A valiant and courageous type of Armenian inhabits the high valleys in the north-west of Ispahan. There are also Armenian Gypsies called Magagorse, who inhabit mainly the villayet of Sivas. They are to be found also in Mersivan. At the beginning of spring, they spread to seek agricultural work, and return for the winter to their respective hovels. They speak good Armenian, and are zealous for religion. The highest ambition of the men is to make a pilgrimage to Jerusalem, and return hence with the new title of Magdessi (or Chadji). They do not know how to write or read, but enjoy some prosperity, and are decently clad. The true Armenians, however, do not marry with them, and between both parties there are endless and ruinous disputes in the tribunals.

The Armenian highlanders in the Caucasus, and elsewhere, differ widely from the Armenians in the lower valleys and plains.

Occupations.—Unlike Jews, the majority of the Armenians are agriculturalists, peasants, field labourers, cattle-breeders, working hard and leading a very simple, patriarchal, mostly miserable life. But like Jews they are also an eminently commercial and industrial people, good financiers, excellent artisans, competing successfully not only with such relatively weak commercial nations as Georgians, Tartars and Turks, but also with astute people like Greeks, Jews and even European nations. Though suffering from injustice, their situation in commerce in Turkey remains on a satisfactory level. When they do not export themselves, they remain necessary intermediaries in the delivery to European markets of many of the products of Anatolia—carpets, wool, cotton, silk, cereals. Armenians have known also how to maintain an honourable place in the trade in the importation of textile fabrics, metals, hardwares, building materials, watches and jewellery. Armenian artisans are known for their intelligence and skill in small industries such as metalwork, weaving, carpet manufacture or embroidering, printing, dyeing, etc.

Armenians as merchants and artisans are far superior to the indolent Turks; they value education, are more open-minded, have more initiative and are intelligent, insinuating, cunning and artful. Armenians have developed a harder and stronger type of mind than that of their rather effeminate, lazy, improvident and ignorant neighbours, the Persians, Georgians and Tartars. They not seldom abuse their superior knowledge and craftiness in their dealings even with such warlike people as the Kurds, brave riders, excellent herdsmen, but very children of nature, completely ignorant of the laws and usages governing modern civilised communities. A Kurd brings his sheep to be sold at a town bazaar, but Armenians will not allow him to proceed as far as the market place; they surround him before he gets there and know how, with shameless hypocrisy and insistence, to persuade him to sell his sheep under the market price. The poor Kurd, incapable of resisting the pressure, abandons his wares with a bleeding heart. Commerce in the Caucasus is in the hands of the Armenians, and the range of their commercial activity in Tiflis, Baku, Constantinople, Sivas, in the Black Sea ports, and even in Moscow and Astrakhan, is considerable. Some merchants in Sivas send their agents to Bokhara, Samarkand and other large Asiatic cities.

Russian Armenians.—Russian Armenians do not suffer from any legal disabilities, for they are placed before the law on an equal footing with orthodox Russians. In consequence they thrive in Russia and are continually growing in number and prosperity. A number of them have attained a high situation in civil and military state service. This state of things attracts numerous immigrants from Turkey. Thanks to their industry, intelligence and great commercial acumen the Armenians have become the most important ethnic element in the Caucasus and Transcaucasia, and are the true economic masters of these beautiful and most promising countries. The principal Armenian towns in the Caucasus and Transcaucasia are Tiflis, Erivan, Kars, Alexandropol, Nakhidjevan, Kagisman, Olty, Elisabetpol, Shusha, Shemakha, Batum, Baku, etc.

The Armenians in Tiflis, from eighty to one hundred thousand strong, constitute the masterful majority of the population. The local industries and almost the whole commerce are in their hands, and besides they own most of the houses and landed property, which their former proprietors, the Georgians, have mortgaged and were not able to redeem. The Armenians constitute three-quarters of the municipal council of Tiflis and they develop great activity. They have many influential papers: literary, political, agrarian, ethnographical, humoristic: numbers of benevolent, scientific and dramatic societies, and their own theatres, where are represented the works of such renowned authors as Gabriel Sundukiantz, Chirvanzadê, Abelian. Besides Tiflis, the Armenians are also very influential in Batum, and in Baku, where they own some of the naphtha wells, and in other towns.

Outside of the Caucasus there are numerous Armenian colonies in the town of Astrakhan, in ancient Bessarabia, in Crimea, Moscow,[1] St. Petersburg, Odessa, and Nakhidjevan on the Don, near Rostoff, which is an important commercial centre of a number of Armenian villages.

Armenians in Russia, as in Turkey, do live, but exceptionally, in compact national communities. The well-to-do Armenians wear a characteristic high conical headgear of dressed lamb-skin (*merlushka*): their dress is a long under-tunic (*beshmet*), and above it a tunic with long sleeves cut through all their length to be flung away over the shoulders. But their greatest pride is the embroidered girdle and the dagger.

Disproportion of Sexes.—The number of women among the Armenian population of Russia is far less than that of men, the proportion being on the average as 100 : 85; in more favourable cases as 100 : 90 (province of Terek and Armenian Catholics in the government of Tiflis); and in the less favourable cases only as 100 : 66 (Kutais) and even as 100 : 60 (Baku). There is no exception to this phenomenon; everywhere among Armenians in Russia the women are less numerous than men. Also Armenians attach far greater importance to the birth of a boy than to that of a girl, and certainly they bestow more care on the education of a boy than on that of a girl.

Turkish Armenians.—The lot of Turkish Armenians is most to be

[1] *S.G.M.*, 1885, p. 321.

pitied. They suffer from the oppression and iniquities of their own government, the barbarous incursions and raids of their neighbours, the Kurdish and Cherkess tribes, and the disdainful attitude towards them of the Mussulman Turkish population. Many of them have been themselves compelled to become Mussulmans. Many Armenians have been expelled from their native towns, and been established by force on the lands near Isnik, Brusa, Angora, and elsewhere.

The Armenians in Turkey suffered greatly from the terrible massacres organised by the government, or at least countenanced by it, in the year 1895-96. The horrors of the slaughter, where at least two hundred thousand victims were cruelly murdered and many hundred villages destroyed, defy description.[1] The lands of the victims have been confiscated or stolen by Kurds. The Armenians who fled after the massacre are now returning and attempting to re-obtain their property.

Out of twenty-five Turkish vilayets, there are eleven partly inhabited by Armenians, but the last are to be found also outside Armenia proper, especially in Constantinople. The most important Armenian towns are Erzerum, Van, Mouch, Bitlis, Kharputt, Diarbekr, Egin, Erzinggan, Sivas, Trebizond. The plain of Erzerum is one of the richest and best cultivated in the whole Ottoman Empire. One of the sanjaks of the Erzerum vilayet, Bajazid, at the southern foot of Ararat, is exclusively Armenian. In the remaining three sanjaks—Erzerum, Erzinjan and Baiburt—the Armenians are mainly concentrated on the two rivers (Kara-su and Murad) forming the Euphrates. They form about half of the whole population of Erzerum. Southwards of Erzerum three small vilayets, Van, Bitlis and Kharputt, constitute the central region of Turkish Armenians.

Van, a town on the lake of the same name, as also Kharputt, have been converted to Islam, like many other villages such as Sandukht, Argo, Agrorik, Shabanos, etc. In Kharputt a number of Armenians have been wrongfully dispossessed of their lands. There are many Armenian Protestants here, who live in peace with their Gregorian co-nationalists. It is a large city with four temples, is the seat of a bishop, and has renowned cloth manufactories. In the vicinity there are fourteen Armenian villages, having temples and schools. There is no difference in customs and habits between the citizens and the country people. Being on the main route to Bagdad, Kharputt has a great future before it.

On the southern shore of the Black Sea are to be mentioned Trebizond, Samsun, Sinope, Ordu, Kerasun, Bafra, Ineboli. Trebizond, inhabited by 8000 Armenians, of whom 6000 are Gregorians, 1500 Catholics, and 500 Protestants,[2] is the most important Turkish town on the coast. It is now declining, but was once a splendid city on the great through route between Persia, Syria, and Mesopotamia on one side, and Caucasus and Turkey on the other.

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[1] Ed. Noguères, *Arménie*. Genève, 1897.

[2] Fr. Mader. *Rapport sur une mission scientifique*. The other numbers of Armenians are taken from the same document.

Samsun is an important commercial port with about 4000 Armenians, partly Gregorians, partly Catholics and Protestants, out of the total population of 17,000. It extends in a hemicycle along the circular harbour. One principal artery is well paved, the streets are neat, and planted with trees. The Armenians inhabit their special quarter: they are mainly occupied with the transport of imported and exported goods, and they cultivate tobacco.

Kerasun is a nice town dominated by an Acropolis. Picturesque hillocks run along the shore. There are ten per cent. of Armenians among the 10,000 Turks and Greeks which form the population. The Greeks are renowned for their weakness for resorting to the tribunals on the most trifling occasions, whereas Armenians prefer to arrange their quarrels by recourse to their notables. Kerasun, like Ordu, exports to Marseilles very considerable quantities of hazel-nuts.

Ordu includes about 2500 Armenians, occupied like their other co-religionaries on the Black Sea with commerce and tobacco growing. The town extends along the shore, and the hills that surround it are covered with vines. Like some towns in Sicily, Ordu has low square houses covered with red tiles.

Bafra or Balira has above 1000 Gregorian and Protestant Armenians, and some 300 Armenian Tzygan, or Magagorse, called also Bosha.

Sinub or Sinope, famous in Russian naval history, has about 1000 Armenians suffering much from incursions of Cherkess and Chetchen brigands.

South-west of Mount Karabel is situated the vilayet Sivas with its chief town of the same name, one of the most graceful and picturesque cities in Asia Minor. Besides Sivas, the Armenian quarter of which—Ochdar—is separated from the town by some ploughed lands, there are in this vilayet about forty Armenian villages with a total Armenian population of more than 20,000, Gregorian and Protestant. In the Ochdar was born Mhitar, founder of the celebrated brotherhood whose chief seat is on an isle near Venice. Gack-Medresse in Sivas is believed to be an ancient palace. The streets and squares in Sivas are dirty, but the inner courts of the houses are kept with relative cleanliness. In the town is shown a cemetery called "Black Soil," where were buried thousands of children trampled down by the cavalry of Timur-Lenk. In another cemetery called "Forty Children" are buried 4000 Armenians killed by the same conqueror. Almost all the tradesmen in Sivas are Armenian, especially the smiths and armourers. They have all great fear of the Turks, who treat them harshly, and use them ill, and, according to Armenian statements, in order to conceal their fortune, even rich men are clad as mendicants, and live in miserable hovels.[1] In the vilayet of Sivas, the main centre of Armenian population, there are some noteworthy Armenian towns and villages, such as Tokat, Amasia, Sherek, Niksar, Turik or Divric.

[1] Archimandrite Garegin Srvandstianz, *Toros Achpar: An account of the situation of Turkish Armenians.*

Tokat, the seat of an Armenian eparchy, is an old stronghold now in ruins. There are above 10,000 Armenians, Catholics, Protestants, and Greeks, besides a majority of Gregorians. The main industries of the Armenians are copperwork, copper being extracted from the Argpy and Kopan mines, dyeing and painting of cloth, and the cultivation of tobacco and the poppy. In the villages surrounding Tokat there are above 10,000 Armenians, and thirteen Armenian temples.

Amasia with 6000 Armenians, of whom 100 are Protestants, is an old stronghold supposed to have been founded by Alexander the Great, and having attained its highest glory at the time of Mithridates.

Not far from Amasia, in the lower basin of the Iris, is the town of Mersivan or Mersifoun, the theatre of violent struggles between Armenians, Gregorians and Protestants. The town possesses a splendid Armenian temple. All her artisans are Armenians. They have founded a national league for the defence of their religion.

Turic or Divric (ancient stronghold) is renowned for the strong constitution of its women, who not seldom bring forth twin boys. In the bishopric of Egin are numbers of Greek-Armenians. They speak and write Armenian, and their priests speak Armenian only; their headgear, priestly vestments, and ritual, are Greek. In the Church the Gospel, missal, and breviary, are read in Armenian, but the mass is said in Greek, with a translation into Armenian. Some prayers are a mixture of Greek and Armenian. Some of the temples are divided into two parts, thus in the vilayet Vank one of the oratories is Greek, the other Armenian, in the Mushehka one of the chancels and a font belong to the Armenians, and the two other chancels to Greek-Armenians.

There are more Armenians in Constantinople than in Tiflis; both these cities are great centres of Armenian activity. Here they are divided into three unequal groups: (1) Stambuliots or Armenians who have been settled in the capital for many generations, and speak a special idiom, mingled with Turkish words, with a peculiar pronunciation; before the massacres of 1895-96 these were about 100,000 strong; (2) Provincials from different centres of Armenia and Asia Minor, Caesarea, Angora, and Brusa, who have arrived with their families, and have mostly forgotten their native language; (3) Temporary immigrants, both young and married people, who have come to seek work as porters, navvies, masons, servants, labourers, workmen, citizens, and petty merchants. The two last groups are each from 20,000 to 40,000 strong. The Turks do not easily accept Armenians as State officials; there are scarcely half-a-hundred of them as such in a total of about 10,000 State servants in Constantinople, and the proportion is even less favourable in the provinces. It is only in the administration of the Ottoman public debt that Armenians are freely admitted. Since the proclamation of the Constitution their lot has, however, been a little bettered. An Armenian has even become a Secretary of State for Foreign Affairs. Armenians now occupy fairly honourable places in international and private financial and commercial institutions, such as banks, railway and tramway companies, mines, water and gas corporations, etc. They occupy also a very honourable place in the import

trade of textile fabrics, metals, ironmongery, construction materials, watches and jewellery.

Persian and Other Armenians.—Armenians in Persia are steadily decreasing: they emigrate to seek for work in Russia or in Constantinople, India, Java, or China. They are indigenous only in the province of Azerbaijan, and concentrate in Tabriz, Salmas, and Urumia: outside this province they are immigrants. They are mostly commercial people, and constitute a class not much above poor, miserable peasants, not safe from exactions, nor the bastinado, at least it was so before the famous Constitution. Some once-rich Armenian colonies, as for instance one established by Shah Abbas I., are now decayed and find themselves, like so many things in Persia, in miserable circumstances.

In Austro-Hungary Armenians are pretty numerous, probably above 10,000. The Armenians in Vienna are divided into two distinct groups: a small secular colony, and the congregation of P. P. Mekhitharistes. The first, about 60 to 70 in number, frequent the church of Mekhitharistes, but for their religious requirements address themselves to the Greek clergy. The Mekhithariste arrived from Trieste in 1810, and have been received by the Imperial family and the Viennese clergy with great favour. They study science and philosophy, possess an excellent printing establishment, and direct a seminary with about thirty pupils destined for ecclesiastical careers. They have a rich collection of Armenian money.

Hungarian-Armenians, mostly Catholic, dwell in Transylvania and Bukovina. In the former province there are two Armenian commercial colonies: Szamos-Ujvar or Armenopolis and Ebesfalva or Elisabetopolis. These colonies were assigned to them in the seventeenth century, but they are being gradually absorbed by the Magyars, and only a few of these Armenians remember their native language. They are mostly commercial travellers, but are not nearly so ubiquitous as their commercial rivals the Jews; they have conserved most of the former traditions in commercial affairs. Armenians settled in Bukovina as long ago as the eleventh century; they have increased since and constitute now in Czernowitz, Suczawa, and other towns prosperous communities. More or less prosperous colonies are to be found also in Venice, Trieste, Marseilles, London, Amsterdam, Malacca, Singapore and Shanghai.

Customs and Habits.—Being a very old and conservative nation, Armenians, especially the country-people, have preserved ancient customs and usages which as such have a considerable interest. These illustrate patriarchal life of, perhaps, more than two thousand years ago. There is, of course, a great diversity of customs in different lands and in different social strata, for there are educated Armenians of high social standing, and very ignorant, poor, crushed and bigoted people.

Armenians appreciate social distinctions, rank, culture, learning, piety. Before all things they are fond of money, and in the art of making money they are not inferior to any other nation. They are unrivalled in the economic struggle with the nations they come in contact with, and easily get the upper hand. Most Armenians lead

a true Asiatic life. Their women envelop themselves from head to feet in a veil: in Turkey many women as well as men go bare-footed. Women do not speak with men and seek to avoid them. Men wear, usually, long dresses. There is no furniture in the house, neither chairs nor tables; the people sit on carpets or low divans, and for meals they gather around brazen dishes put on the floor. They write sitting down on their heels, keeping the paper on their knees.

They are hospitable. If any one has a guest in a village, his neighbours send him victuals—milk, butter, honey, and wine—and come themselves to partake of the meal. There being few distractions, family festivals play a very important rôle.

Birth.—A new-born infant is sprinkled with salt and is not bathed till the second day. Soon after the birth a *terter* (priest) is brought into the room to say prayers, sprinkle the chamber with holy water, and put the Gospel under the young mother's pillow. The parents and their friends drink wine, and manifest much joy at the birth of a boy, but it is rather a disappointment when a girl is born.

Baptism takes place on a Sunday about forty days after birth. There is a godfather but no godmother. The child, carried by the nurse, is plunged into water, and then left for a week without a bath. Whilst the godfather takes the child from the font, the priest twists threads of white cotton and red silk to make a string which he binds round the neck of the infant, as a symbol of the blood and tears shed by Jesus crucified. After the baptism the child receives the sacrament, and as early as possible it is brought to the church to receive the sacrament once more, and so on every important holy day. On the evening of the day of baptism there are festivities in the house of the parents, accompanied with much drinking and noisy manifestations of joy. To preside at the banquet, a *tulumbash* (chairman) is chosen, who is invested with discretionary powers to propose the health of each person present in turn, according to their rank, to see that at every toast the full cups are emptied, and to punish the refractory by obliging him—to the great joy of those present—to drink twice as much. After each toast the whole assembly sings in chorus thrice *mraroljaria* (the German Hoch).

Betrothal.—Armenians are not a sentimental people. A young man desiring to take a wife is not guided in the choice of his future companion by affection. Wives are scarcely to be considered as true companions of their husbands, their situation is quite subordinate; they have to serve their husbands and obey them.

The Armenians do not recognise divorce *a mensâ et thoro*, but husband and wife may be divorced, and the guilty party has no right to marry again. An Armenian desiring to take a wife sends, without previous courting, one of his friends or relations to the parents of the young person to ask in his name for her hand. When the parents are not disinclined to accept the offer, they appoint the day and the hour when the intended may meet and see his future bride; the place of rendezvous being usually a public garden or a church during the service hours. It is not seldom the first time that the wooer has the opportunity of

examining silently his intended wife. If the examination is satisfactory and the wooer declares that the young person pleases him, then, as a token of the seriousness of his intentions, he offers a small present. There is no question of the consent of the bride, who has to obey the will of her parents. A week after this first meeting, the time being employed in obtaining information as to the fortune of the interested parties, the wooer, accompanied by a priest and friends, calls at the house of his intended. The priest consecrates the betrothal, and the bridegroom this time presents his bride with a gift of some value. Armenians keep their head cool, they seldom depart from a certain mistrust, and are always rigidly calculating. There are stories of beautiful brides replaced at the decisive moment by others less attractive. If all goes well, the elders do not delay any longer in appointing the wedding-day. Before taking leave of his bachelor's state, an Armenian needs to sow his wild oats: for some days he leads a disorderly life in company with his friends.

On the wedding day the bridegroom sends his friends to the parents of the betrothed in order to bring home the promised trousseau. The proceedings are noisy, for the joyful messengers are accompanied by musicians, and the procession of street-porters (*mushat*) charged with chests of drawers, tables, looking-glasses, beds, cushions, carpets, and articles of clothing, naturally excites general curiosity. The conveyance of the trousseau, in fact, rouses the whole neighbourhood, and provokes on the part of the audience a thousand comments. On his side the bridegroom sends on this occasion to the parents of his bride some bread and a sheep. On the evening of the same day, the bridegroom calls at the house of his bride, offers her a new wedding gift, and presents to his future parents upon a tray four wax-tapers and two sugar-loaves. The wedding takes place at midnight. The betrothed are accompanied to the church by their sponsors. After the nuptial ceremony, during which the priest reads the duties of man and wife, the new married couple are conducted to the home of the man's parents, and at each door they pass their friends cross daggers above their heads. On approaching their home they are met by a near relative, who offers them a cup of water to drink. In crossing the threshold of his own house the new husband is expected to break a plate placed in his way.

These are the usual proceedings in Caucasian villages. The marriage ceremonies in Turkey are somewhat different. The young man rides to seek his betrothed on horseback, and she awaits him also mounted. She is veiled in white and keeps in her hands the end of a long belt, the other end of which is left loose, and is to be grasped by the bridegroom. The parents and friends, all mounted, follow the couple to the temple, bearing wax-tapers in their hands. To poor people, the necessary horses are readily lent by their rich neighbours. At the foot of the altar, the betrothed join their foreheads, the priest places the Gospel on them and reads the passages concerning the duties of married people. He asks the man whether he is willing to be master and patron of his wife, and he asks the wife whether she is willing to be docile and devoted to her

man. Then he joins their hands and the ceremony is over. The nuptials are always accompanied by many days of feasting to which the relatives and friends of the young couple are invited. These feasts cost a lot of money, and are very noisy. Any place is suitable for the gathering: an inn, a wine cellar, a garden, a flat roof, the main condition required being abundance of food and drink. Armenians are generally sober, but on these special occasions they allow themselves to drink to excess, and manifest their joy with great exuberance.

Armenians have kept up the patriarchal habits of their ancestors: the newly married couple remains dependent on their parents; the young husband brings his wife to dwell under the parental roof, and she is expected to obey not only her husband, but also her mother-in-law and all the other older female relatives of her new family. Before she gives a child to her husband she remains extremely docile and submissive, with tightly closed mouth. With a child on her bosom she gains in respect and consideration, but even then and for a long time an Armenian woman appears in the street with uncovered face, but with the mouth and lower part of the chin closed by a white bandage. It is the tongue of women, not so much their faces, that the Armenians consider most dangerous to their domestic peace.

Armenians respect the family, the *thonir* or *tandur* (hearth) is a sacred thing: the children have great respect for the head of the family, and do not dare to take a seat in his presence without permission. Armenian mothers are known for the deep affection they cherish for their children. There may be not much poetry in the married life of Armenians, but there is not much infidelity.

The young women have all an ardent desire to have children, and if they do not get them they have recourse to numerous superstitious practices in the hope of obtaining them. Thus in the neighbourhood of Etchmiadzin is a village which organises every year at the beginning of summer a famous feast in the honour of S. Messrop. Women desirous of having children betake themselves to the saint and steal some objects in the temple. If later they become pregnant the object is restored with numerous gifts.

Funerals.—In funerals as in other family ceremonies Armenians like noise and publicity. Persons of some notoriety are buried on Sundays to get more people at their funerals: those of common rank are buried on the third day after death. The washing, dressing, and laying in a coffin or a bag of new cloth, as also the prayers are usually performed by a much detested but useful man called *mordichon* (French *croque-mort*). He is a humble personage who gets no other recompense for his sad work than the clothes and ornaments that may be on the person of the deceased. At the news of somebody's death, his relatives and friends, especially women, betake themselves to the mortuary house to express their condolences. The mourning is noisy. The female members of the household squat in one corner of their room and there receive the visits of condolence. At the view of each new visitor there is a renewed burst of lamentation, gradually appeased. The visitors are in no hurry, it is not becoming to leave the mourners alone with their

grief, and the house remains full of people, who expect to be entertained. But there is no fire kindled so long as the body of the deceased remains in the house. The preparations for the great post-mortem entertainment begin only after the removal of the dead. The body is laid in the coffin as soon as this is brought, and the coffin is put on a table in the middle of the room and surrounded by tapers. All the while a sacristan or mordichon reads prayers. On the third day after the death the body is brought to church for the mass and then later to the cemetery. Men alone accompany the body to the grave. The coffin of a distinguished person is borne to the cemetery on the shoulders of his friends. Those present do not form a procession but gather around the coffin in a crowd. Priests taking part in the funerals as well as singers wear sacramental dresses of light colour. The coffin usually remains open. Sometimes the procession is accompanied by sacred images and banners, and the funeral car is adorned with wreaths and flowers. There is no calculated ceremonial deliberateness in the proceeding, but on the contrary some haste. The clergy precede the procession chanting in a sing-song manner the *Sarakans*. At the cemetery the coffin is lowered into the grave and the mourners hurry to gather around the great repast prepared meanwhile by the parents of the deceased. When the bereaved family is rich those feasts last quite a week and are offered even to strangers. Armenian funerals are expensive and are certainly characteristic of a nation otherwise so sober and economical. The excesses they indulge in on these occasions may be a natural reaction against their otherwise dull life.

Arts and Literature.—Works of art and literature are the best testimonies of a nation's spiritual grandeur. The Armenians have of old distinguished themselves by architectural art, theological and historical works, as also by translations from Syriac, Arabic, etc.

According to Professor Patkanoff the Armenian language constitutes a testimony of the great antiquity of the people speaking it; it occupies a middle place between the Iranian and the Slav-Lithuanian groups, and represents an independent branch of a lost family of languages.[1] There are twelve dialects.

The ancient Armenian works have mostly if not entirely perished, but there remains innumerable churches and convents dispersed all over Asia Minor, Caucasus, Persia, that are testimonies of high art and remarkable for the difficulties surmounted in their construction on the summits of mountains or in narrow mountain gorges. There are churches hewn out in rock. Many of them contain precious collections of MSS., mostly copies of Gospels, themselves remarkable objects of fine art. Even in our days, the extensive ruins of Ani, on the Arpa Chai, with their cathedrals, chapels, castles, of a high style of architecture, afford evidence of Armenian art.

The most famous of the still existing sanctuaries in the eyes of Russian Armenians are the cathedral of Etchmiadzin and the chapels in its vicinity belonging to the saints Gayiane, Ripsime and Solakath;

[1] Patkanoff, *Izsledovanie o sostave Armianskago iasyka.*—Moskva.

whilst in the eyes of Turkish Armenians the most esteemed sanctuary is the temple of Surb Karapet in Mush.

As objects of fine art may be regarded the Armenian manuscripts dispersed in a number of libraries and convents, such as Paris, Vienna, Venice, Etchmiadzin, Constantinople, etc. They have considerable value for Christian theologians, and have been the objects of the studious researches of scientific missions from France and Germany.

A considerable number of MSS. were made by pious men, who desired to copy the Holy Scriptures to ornament convents and churches. In their dedication, they implored the faithful of the community to pray for the safety of their souls and strongly condemned those who under any pretext should remove these MSS. from the church.

Some MSS. contain fragments of the history of Armenia. Many of them are coloured and illustrated: the illustrations represent usually religious scenes and portraits of saints. They are written in very old *erkathagir* or *bolorgir* upon parchment, with golden or purple ink. The copies of the Gospel deposited in the convents are often ornamented with miniatures, rich stuff, pearls and other precious stones.[1]

Literature.—The first impulse given to modern Armenian literature came from Venice and Vienna in the eighteenth century, and a little later from Constantinople and Smyrna (at about 1820-1830). Armenians have produced many newspapers, and have translated some French and German romantic works. The Armenian language has acquired in the absence of national unity quite a remarkable degree of development. Printing presses have been established in most of the cities where Armenians are numerous. In Russia the Armenian press has grown in importance since 1828, that is since the annexation of the Ararat part of Armenia. The Armenians have now in Tiflis and Baku a number of renowned literary, dramatic and scientific authors. They have two daily papers in Armenian, and one in the Russian language, which exercise influence also in the Turkish and Persian parts of Armenia. There are besides two weekly literary reviews, one agronomic, one humoristic, and two or three monthly, and one ethnographical publication, quite at the level of similar publications in Europe.

Notwithstanding the rigours of the censorship the Armenian press in Constantinople is by far the most important among the polyglot publications of the Turkish capital. There are now published fourteen periodicals, of which seven are daily, five weekly, one bi-weekly, and one monthly. These journals and reviews are political, literary, scientific, economic, sociological and satiric. There are also Armenian publications dealing with history, biography, philology, pedagogy, social economy and philosophy, both originals, and also in translation from the French, English, German, Italian and Russian languages.

An Armenian writes in a figurative, passionate, high-flown style: he would say, for instance: "The sea of life boils in my soul, its troubled and poisonous waves gnaw my breast as one buried alive gnaws the lid of his coffin."[2]

[1] *Nouvelles archives des missions scientifiques et littéraires.* Paris, 1900.

[2] *Avetis Aharonian.*

Bibliography.—Documents for the study of Armenians both in their own and in other European languages are not wanting. The following are some of those in English:—H. F. B. Lynch: *Armenia: Travels and Studies* (London, 1901) (see *S.G.M.*, 1902). Curzon: *Armenia* (London, 1854). H. Barkley: *A Ride through Asia Minor and Armenia* (London, 1891). Rolin Jacquemyns: *Armenia, the Armenians and the Treaties* (London, 1891). Mark Bell: *Around and about Armenia* (see *S.G.M.*, 1890). Anglo-Armenian Association: *The Case for the Armenians* (London, 1893). Dr. Felix Oswald: *Explorations in Armenia.*

THE USE OF PLACE-NAMES IN THE TEACHING OF GEOGRAPHY.[1]

By James A. Ramsay, M.A.

Present-day ideas concerning Geography have shown us how very comprehensive the subject is. The matter dealt with and the methods adopted in teaching the subject have also shown that Geography draws largely upon many other sciences, including Geology, Physics, Astronomy, and Botany, and to a small extent Ethnology. There is also, however, another "side-issue" which might be treated, namely, place-names. The aspect of the subject has, so far, been almost entirely left in the hands of a few enthusiastic philologists; it has not yet entered to any appreciable degree into the teaching of Geography, and it is because I have found place-names, their meanings and their "story" so interesting, that I venture to lay my arguments before you.

Isaac Taylor in his *Words and Places* says: "The names which still remain upon our maps are able to supply us with traces of the history of nations which have left us with no other monument. . . . The knowledge of the history and the migrations of such tribes must be recovered from the study of the names of the places which they once inhabited, but which now know them no more—from the names of the hills which they fortified, of the rivers by which they dwelt, of the distant mountains upon which they gazed. . . . Language adheres to the soil when the race by which it was spoken has been swept from off the earth, or when its remnants have been driven from the plains which they once peopled into the fastnesses of the surrounding mountains."

To study place-names in detail, and follow the movements of all nations on the earth as traced through place-names, would involve a task beyond the scope of the teacher of geography, and far beyond the grasp of his pupils. The teacher will mention in his teaching the meanings and significance of such names only as he thinks his class will comprehend thoroughly. Hence his use of Etymological Geography is of necessity limited in extent, but, however few be the names he deals with, he can by their means make his subject more vivid and realistic. The imagination of his pupils will be stirred, and the results will be an

[1] A paper read at a meeting of the Geographical Section of the Royal Philosophical Society of Glasgow on 5th December 1912.

awakened interest and a more intelligent view of the world and of mankind in the history of the world.

It has been argued that the study of place-names lies within the province of the historian rather than the geographer, and place-names are undoubtedly a very useful adjunct to the study of history. The movements of peoples, their conquests, their settlements, may all be followed out by studying names. Geography, however, deals with the conditions under which men live, and these same conditions may be the cause of their migrations. Therefore I contend that in so far as the circumstances under which or owing to which a people moves and forms new settlements with names of their own are geographical, it lies within the province of the geographer to deal with these names.

But even if it be granted that the story of place-names lies in the province of history, still the teacher of history makes little or no use of these names in order to show colonial expansion or any movement of nations. His work in schools is usually confined to our own islands and Europe. The rest of the world's history is a closed book to the pupil. Why, then, should not the teacher of geography take up this line of study? It is a branch of education of great value; the child can be told to look for names in a particular language on the map. Such names indicate the presence of a particular people in the country at some period in history. Take, for example, Spanish, French, and English names on the map of North America.

The main point, however, lies in the fact that geography and history are in certain important respects closely related. As I have already said, geographical environment may be the cause of historical events; the configuration of a country determines the sites of battlefields, fortresses, etc. No teacher can study the geography of a country, say one of our colonies, without indicating to a certain extent the facts which led to its discovery or exploration. The motive may have been—and it frequently was—a commercial one. Commerce, as we know, depends largely on geographical circumstances. The crops and products generally —vegetable, animal, or mineral—depend on certain conditions; the observation of these conditions, principally in connection with vegetation and animal life, and the showing how they are related to these products, form a large and important part of the domain of geographical teaching. Plants, as we know, are very susceptible to differences in temperature and amount of moisture, etc.; the finding of lands suitable for their growth, the colonisation and the eventual commercial activity of these lands, must therefore be within the sphere of geographical teaching.

One of the best examples of this close connection between geographical environment and colonial expansion may be instanced in the case of the rise of the Portuguese navigators in the fifteenth century. The motive of their movements was purely commercial, and was due to the then important spice trade. The spices, as is well known, came from the East—India and the East Indies—by the overland route, a route which was beset with difficulties and dangers which led to the spices becoming very expensive. The Portuguese, under their famous prince, Henry the Navigator, had studied the maps of the world as it then was supposed to

be. They determined to find a way to the Indies by sea, and after a long and arduous struggle they succeeded. All along the course of their voyages are to be found place-names in the Portuguese language. The names Madeira, Canary, Cape Blanco, Cape Verde, Lagos, Guinea, are of Portuguese derivation. The Dutch followed up the Portuguese after the defeat of the latter country at the hands of Spain; hence the Dutch settlements in Africa with their characteristic Dutch names—Orange, Vaal, etc.—and the Dutch East Indies, the main source of Holland's wealth to-day.

The stories of the discovery and development of new lands are of immense value to geographical teaching. The motive, the course of the voyages, the maps, the products obtained—all form part of the material at the disposal of the geographer, and so, also, do the *names*.

There are, of course, other circumstances which may have induced movement on the part of a people—the sterility of a country, as in the case of the Persians and Arabs: in these cases there was a struggle for existence, a struggle which eventually led to invasion and the forming of vast empires. Look how the names in Southern Spain indicate the presence of the Arabs once upon a time: the teacher or geographer cannot pass this point when dealing with this country. In the case of the Phœnicians there was an inhospitable hinterland. Expansion was impossible in that direction. The finding of a particular shellfish which produced a valuable purple dye led to the formation of settlements where such shellfish were found. Here they could extract the dye and leave the dead-weight behind: this was more suitable than taking the shellfish to their homes at Tyre and Sidon.

Then we may mention the use of copper and tin by the Phœnicians, their journeys in search of these metals, and the routes they followed—the valley of the Rhone, and thence by the Seine to the shores of France and Britain. Traces of their settlements may still be found in the place-names in certain parts of Italy, Sicily, and Spain.

The sterility of the land may be given as the cause of the invasions and consequent settlement by the Franks, the Longobards, the Vandals, the Huns, and the Turks, and it is interesting to note the names of the portions of Europe occupied by these peoples; they are named after the people who settled there (France, Lombardy, Andalusia, Hungary Turkey).

The question may now be raised—can the significance and meaning of place-names be dealt with by pupils of all ages? There most certainly must be a limit somewhere; very young pupils are practically out of the question altogether. But in elementary schools the subject can be discussed with a measure of success; the amount of success or of interest excited will depend on the teacher. He must use his own judgment concerning which names can be explained to his class; the ages and intelligence of the pupils must be considered. Names are frequently descriptive in character, indicating size, colour, or some other outstanding characteristic, and the lesson can be made vivid, the imagination of the pupils can be awakened by the description of the place showing why the name was given.

In higher classes or in Secondary Schools the task is much easier. Here the education of the pupils is farther advanced, they have a knowledge of languages which is of immense value, and the work of the teacher is easier.

It would be a serious mistake, however, to exaggerate the importance of place-names and their meanings in relation to the other work dealt with in geographical teaching: there are many factors of greater importance in geography than names and their import, *e.g.* climate, productions, occupations of the people. In certain classes, where the field of work is extensive, the time spent in dealing with names must be of necessity very limited. There is no reason, however, why in certain higher classes a special study of this branch of geography should not be undertaken.

If no special examination be in view, there is a splendid opportunity offered to the teacher of geography to take up some special department of geography for study in these classes, and the story of place-names might form a very useful and interesting study.

The results of a course of study of place-names, however scanty be the amount of work done in this department, are of great and far-reaching importance. I have already mentioned the voyages of the Portuguese in their search for the sea-road to India. The story of this famous exploit would form a most interesting lesson, the names dealt with would give an added interest to the narrative, and no doubt the lesson would create a desire to learn more concerning these early navigators. There is, therefore, a distinct effect on the reading of the pupils. Lives of great navigators and explorers form most interesting and instructive reading, and the very mention of Frobisher, Parry, Franklin, Magellan, Cook, as recalled by parts of the world's surface commemorated by their names, should act as an incentive to a healthy outlook on life.

I have examined at various times copies of text-books of geography used long ago, and in quite a number of cases there were given lists of names and their meanings, showing that our grandparents saw some important facts in mere names, and made use of these in the teaching of the subject. It seems as if I am really attempting to revive an old interest; it has been lying hidden away among the dust of the past, and if this interest be reawakened and put to practical use in our schools in connection with the teaching of geography, I am sure the results will be all for the benefit of education and the training of those faculties which tend to make a boy a good citizen.

NOTE.—Among the books which the teacher may use are:—A. J. Bury, *The Association of History and Geography* (Library of Pedagogics); J. B. Johnston, *Place-names of Scotland* (1903); Sir Herbert Maxwell, *Scottish Land-Names* (1894).

GEOGRAPHICAL NOTES.

Asia.

The Physiographical Divisions of China.—Professor Eliot Blackwelder contributes to a recent issue of *The Popular Science Monthly* an interesting article on China, in which he recognises the following typical physiographical divisions:—(1) The north-eastern mountain region, typified by the province of Shantung, with broad valleys connected by easy passes over the low, isolated mountains. Roads are plentiful and easily made, so that carts and wheelbarrows are extensively used, but on the other hand the streams are of little use for navigation. The people are clustered in the broad valleys. (2) To the west comes the broad plain of the Hoang-ho River, floored by thick deposits of silt, densely peopled and intensively cultivated. There is not sufficient water for rice, but the dry-land grains, together with cabbages and potatoes, are grown. The numerous streams and their shifting courses make road construction difficult, but the extensive canal system allows for great freedom of intercommunication over the plain, and makes the people more homogeneous in customs and languages than in the other parts of China. The great drawbacks are the absence of fuel and fodder, and every scrap of straw or stubble is used up for one of these purposes, so that the fields are absolutely bare in autumn and give rise to great clouds of dust. (3) To the west and north-west lie the rugged plateaus and mountains of the loess region. Here there is little water for irrigation, but the fertility of the loess leads to its being most elaborately terraced on the hill sides. Communication by water is not possible, and in the more mountainous parts road construction is difficult, and pack animals are largely used. Coal is extensively produced here, but the difficulties of communication make it impossible to transport it to any great distance. (4) To the south-west lie the Central Ranges, with a very rugged surface, and isolated patches of cultivated land. Pack animals and coolies are the only available means of transport in the more remote regions. In consequence, despite the demand for fuel in other parts of China, it is almost impossible to bring the lumber of this mountain region to the plains. Rice is cultivated where possible, and the opium poppy, though not in local demand, used to be a favourite crop owing to the fact that the product is of high value and small bulk and will thus pay the cost of transport. This region of the Central Ranges is traversed by the great Yangtse River, which, despite the difficulties presented by its gorges enables the products of (5) the rich province of Szechuan to be carried eastwards. This broad basin, with its floor of soft sandstone beds, and its varied topography, produces a great variety of crops, such as silk, oil, lacquer, rice, with many other grains and garden vegetables. Protected by mountains to the west the province is one of the most stable and progressive in China. Finally, to the south-west comes (6) the mountain region of Southern China, with a very rugged surface, great difficulties of communication, and settlement practically confined to the few level valleys.

America.

Meteorological Observations in the Sierra Nevada.—We have received two pamphlets giving interesting accounts of observations made at Mount Rose Observatory, a high level station in the Sierra Nevada placed on the summit of the mountain named at a height of 10,800 feet above sea-level. This is the highest meteorological station in the United States, and owing to the position of Mount Rose at the western edge of the Great Plateau is well fitted for the study of mountain and desert meteorology. Two other stations at lower levels carry on observations simultaneously with the summit station, and in addition very detailed observations are being made with the object of predicting frost, and also of determining the limits within which fruit-raising may be profitably carried on on the lower ground. Observations spread over a wide area in the basin of the Truckee River show that where the minimum temperature is never less than 28° F., fruit-raising is highly profitable. Where the minimum temperature lies between 24° and 27° F., heating of the orchards must be resorted to in frost, hence the necessity for frost warnings from the summit station. Where the minimum temperature lies between 18° and 23° F. fruit-raising ceases to be profitable.

Another point to which attention is being given, and which is of great importance in this irrigated region, is the relation of mountains and forests to snow conservation. It is upon the mountain snow that the irrigator must often depend to fill his canals, and it is therefore very necessary to find out what kind of forest is most effective as a snow trap. It is found that belts of timber on the tops of cliffs and lee slopes increase snow accumulation at the foot of these, and also by checking wind diminish the rate of evaporation of the snow. On the other hand unbroken forests catch falling snow in proportion to their openness, but conserve it afterwards in proportion to their density, *i.e.* in proportion to the extent to which they shelter the ground from wind and sun. Forests should therefore be light, with numerous glades to permit of snow accumulation, but the area of the glades must bear some proportion to the height of the surrounding trees. At high levels, 8000 feet and higher, the mountain hemlock is found to be the best tree, for its tapering form allows the snow to slip down to the ground below, while the dense foliage afterwards protects the fallen snow from evaporation. Thus the planting and management of forests in catchment basins which in winter are snow-covered, requires a considerable amount of care and consideration.

Glacial Excursion of the Geological Congress.—Several of the excursions in connection with the twelfth International Geological Congress, which is being held in Canada this summer, will go from Toronto to Vancouver. Then an excursion (C8., August 29 to September 22), under the leadership of R. G. M'Connell, and with the guidance of R. W. Brock, D. D. Cairnes, and W. W. Leach, will traverse the fiords of British Columbia, ascend the Skeena River valley from Prince Rupert to Aldermere by rail, visiting the silver-lead mines and coal mines, and continuing to Skagway by steamer. There will be stops at the copper

mines on Portland Canal and the Treadwell gold mine on the Gastineau fiord at Juneau. The excursion will then cross the Canadian Coast Range by the White Pass and Yukon Railway to Whitehorse, stopping at the copper deposits there and the coal mines at Tantalus, descending the Yukon River to Dawson and the Klondyke gold field in the driftless interior plateau near latitude 64° north.

After the return to Skagway an excursion, under the direction of Lawrence Martin of the University of Wisconsin, will be made on a special steamer to the Malaspina Glacier, Yakutat Bay, and Muir Glacier. This glacial excursion will last five days, with a possibility of two days more in case of cloudy weather.

The first day will afford an opportunity of seeing the Fairweather and St. Elias Ranges, 16,000 to 18,000 feet high, and covered by snow-fields and glaciers. These ice tongues include the La Perouse, Malaspina, and many smaller glaciers. The front of the great piedmont ice sheet of Malaspina Glacier will be followed, affording an opportunity of seeing the tidal ice front of the Guyot lobe west of Yahtse River, the moraine-veneered ice cliff of the Seward lobe at Sitkagi Bluffs, and the forest-covered terminus of the Marvine lobe near Point Manby.

On the second day something will be seen of the eastern border of Malaspina Glacier in Yakutat Bay, and the forested terminal moraine of the Yakutat Foreland. Landings will be made in Disenchantment Bay in connection with various glacial phenomena such as the shrub-covered ablation moraine upon the ice of Variegated Glacier, the streams engaged in carrying and depositing outwash gravels, the calving of ice-bergs from Hubbard and Turner glaciers, the cirque vacated by a fallen glacier, and the beaches, rock benches, sea cliffs and islands which were uplifted from 7 to 47½ feet during the earthquakes of September 1899.

The third day will be spent on and near the Nunatak Glacier in Russell Fiord. Here the hanging valleys, the till-veneered, overridden outwash gravels, and the tidal, land-ending and cascading glaciers will be visited and studied, as well as the phenomena of glacial erosion in the barren area from which the ice has recently retreated and of fault scarps made during the 1899 earthquake. Some of these scarps are vertical and are 4½ to 8 feet high.

The fourth day will afford an opportunity of seeing the morainic and glacio-fluviatile phenomena about the terminus of the Hidden Glacier, which advanced 2 miles between 1906 to 1909, as a result of the earthquake avalanching in 1899, which has subsequently caused nine ice tongues of Yakutat Bay to move forward. After this landing something will be seen of a fiord with submerged hanging valleys, submarine moraines, buried forests, shorelines depressed in 1899, and the high strand lines of a former glacial lake.

Part of the fifth day will be devoted to Glacier Bay, where there has been a recession of 8¾ miles at Muir Glacier from 1899 to 1911. A landing will be made in Muir Inlet to see the buried forests, the vertical ablation of over 1200 feet of ice in twelve years, and many other phenomena. The rapid recession of Grand Pacific Glacier in Reid Inlet at the head of Glacier Bay now places part of this fiord in Canada.

The glacier melted back 5000 to 7400 feet in two months during the summer of 1912, as was determined by N. J. Ogilvie of the Canadian Boundary Survey. At the International Boundary there is now dry land and open fiord where the ice was at least 1750 feet thick as recently as 1894. Sixty miles of Glacier Bay have been opened to the ocean by glacier recession since 1794, making an arm of the sea as long as Hardanger fiord in Norway

Progress in Brazil.—A recent *Report* on the Consular District of Rio de Janeiro, by Mr. Acting Consul-General Hambloch, contains some interesting facts both in regard to the city of Rio de Janeiro and to Brazil in general. It is noticed that the importation of Argentine cattle into Brazil has almost ceased, and that not only does Brazil practically supply its own market, but the question is being raised whether an export trade in cattle and meat cannot be started. The quality of the meat is not very high, and attempts to improve the breed by importing European stock are rendered difficult owing to the liability of European cattle to Texas fever. Cold storage plants are, however, to be erected, and a company is being started with the object of exporting frozen beef to Liverpool. The matter is of considerable theoretical interest, as the question as to whether tropical countries will in course of time become stock-raising areas has often been debated by geographers, without any definite decision being arrived at.

Brazil is also endeavouring to develop its own fisheries, with as yet apparently but little success. At present dried cod is imported to the extent of about one million pounds' worth yearly, about half the total coming from Newfoundland. The export of fruit is increasing, though the total export is still insignificant. Attempts are being made to stimulate wheat production, though as yet with but little result, but on the other hand the levy of a customs tax on imported rice has considerably increased the home production, with a corresponding decrease in the imports, of which India is the chief source. On the other hand the effect of high taxation may be seen in the cost of living, estimated as three times as great, in the city of Rio, as in Europe, and in the growth of trusts. Another disquieting feature is the employment, without regulation, of female and child labour in factories. In 1911 a measure to prevent the employment of children under ten years of age was proposed but dropped.

The cattle industry is carried on chiefly in Minas Geraes, which also produces for export rice, coffee, potatoes, beans, tobacco, maize, etc., and has very large and apparently very valuable deposits of iron ore, as yet not worked on a large scale owing to the difficulties of communication in this hilly state. Of the population of four and a half millions in this state some three and a half millions are estimated to be engaged in agriculture and the remainder in the mines.

General.

Winds in the Free Air.—Mr. Charles Cave recently delivered before the Royal Institution an address on this subject which is printed

in *Nature* for May 22. The address is based largely upon results obtained by Mr. Cave from the sending up of balloons containing a meteorograph from Ditcham on the South Downs, and for the most part these results are of somewhat too detailed a nature to lend themselves to a summary. Thus a very full account is given of the different currents of air met with by the balloons in ascending through the troposphere. From the discussion we extract two points of general interest. The first is an explanation of the phenomenon—probably more frequent at Edinburgh than at Ditcham!—of continuous rain with a north-easterly wind. It is difficult to see how such a wind, especially in south-eastern England, can be saturated, in view of the fact that it has crossed only a narrow sea. Mr. Cave finds evidence that the rainfall is due to the presence in the upper air of a south-westerly wind bringing moisture from the Atlantic. So sure is he of this that, though living only twelve miles from the Channel, he does not hesitate to send up balloons even in this type of weather, being sure that they will be caught in the upper current, and so carried westward and not out to sea. In point of fact they generally descend in the Midlands or in the eastern counties.

The other point of special interest is that Mr. Cave's results confirm the suggestion, made by Dr. Shaw, that the changes of pressure to which the weather at the surface owes its origin, take place, not near the surface of the earth, but just below the level of the stratosphere, at a height of about 9 kilometres. This suggestion is considered in some detail, various types of observed pressure and winds at different levels being considered in relation to weather changes. For details, reference should be made to the original paper.

Commercial Geography.

The Cape Verde Islands.—A recent *Diplomatic Report* gives some interesting details in regard to these islands, which are said to be badly in need of capital for their further development. It is stated that there is plenty of subterranean water which could be raised and used for drinking and agriculture; meantime drought is a serious drawback. The two most important articles exported are coffee, which practically all goes to Lisbon, and Purgueira seeds, which go mostly to Lisbon, but partly to Marseilles. Purgueira (*Jatropha curcas*) is a tropical shrub belonging to the *Euphorbia* family, and offering certain resemblances in the characters of its seeds to the castor oil plant, with which it has been confused. In addition to its purgative properties the oil expressed from the seeds is of use as an illuminant, and the husk of the seed contains much potash, hence the use of the seeds in soap-making. The shrub demands practically no care in cultivation, and is very resistant to drought and strong winds. From time to time the Government has attempted to use it to afforest the waste lands of the archipelago, but the ravages of goats and the fact that the inhabitants prize the plant as fuel, have led to the destruction of these plantations. The output of seed is, however, increasing.

Among the other products of the islands are fruits, which could be exported to a considerable extent if communications were better.

The small exports (about £60,000 in value) go chiefly to Portugal, the mother country. On the other hand the imports, chiefly coal, textiles and provisions, come largely from the United Kingdom, but all come *via* Lisbon, where they are transhipped to avoid the import duties on foreign goods.

NEW BOOKS.

EUROPE.

The Lord Wardens of the Marches of England and Scotland. By Howard Pease, M.A., F.S.A. London: Constable and Co., Ltd., 1913. *Price* 10*s.* 6*d. net.*

Mr. Pease claims for his book, which, by the way, is dedicated to the Master and Fellows of Balliol, that it was written on the only true principle—to please the author. We believe, however, that it will fulfil another that is, commercially, at least as important, and please its readers. After the rubbish that so often passes for history nowadays, it is a most welcome achievement. The Scottish and English Border is a subject which would lend itself very easily to a sentimental, superficial treatment. Mr. Pease's book is nothing of this sort. It is written with a sound historical sense, and based on careful and extensive reading, as well as, obviously, knowledge of the Marches themselves, which is, after all, the best way to study history. The account of the English Marches is rather fuller than that of the Scottish side; Mr. Pease, for example, does not give the limits of the Scottish Eastern and Middle Marches, though he deals in detail with their English counterparts. This fuller English treatment may perhaps be due to more available authorities. But, taken as a whole, the subject is most completely dealt with. Many of the chapters are, of necessity, purely historical. Such are those dealing with the Border Laws, the Courts and Jurisdiction of the Lord Wardens, the origin of the office of Warden, and such kindred details. But much of the treatment is bound to be geographical. It is suggested, for instance, that the richer soil of the Scottish side of the Border supported a proportionately larger population than the English, but that this advantage was lessened by the bitter family feuds in Scotland, and the fact that this very fertility meant an easier and a richer booty for the raider. Then there are the routes taken by the raiders; fairly numerous, evidently, as the whole line of the English Borderland was systematically watched night and day for half the year. In the discussion of this part of his subject, Mr. Pease, it seems to us, has slightly misunderstood one of his authorities. He speaks (page 162) of a pamphlet of the Historical Association on the historical geography of Northumberland as giving a "Raider's Line" from Carham on Tweed by Harbottle to Chollerford, and seems to understand this "Line" as a common route of Scottish moss-troopers. But what is really meant by speaking of this as a "Raider's Line" is not that it was a common line for raids, but that, once the Northern English shires had come to some measure of prosperity, this line, which roughly coincides with the 600 feet contour-line, was *never* crossed by mere raids, but only by forces of considerable strength. A few such slips are probably inevitable in any book where many authorities are drawn on, and Mr. Pease's method—a very successful and interesting one—is to give the words

of his authorities wherever possible, rather than paraphrase them in his own. There are interesting reproductions of old maps of the Marches from Blaeu's Atlas and elsewhere, but in addition reference is necessary to a modern large scale orographical map, if the geographical points are to be properly understood.

Wayfaring in France: From Auvergne to the Bay of Biscay. By Edward Harrison Barker. Illustrated. London: Macmillan and Co., Ltd., 1913. *Price 7s. 6d. net.*

The title correctly describes the author's wanderings, which were made afoot. In this way he was enabled to penetrate into regions denied to the motorist, and gained a personal acquaintance with the mind and manners of the peasantry. The disadvantage occurred when he had to share their mode of life, and the tale of his experiences is not always encouraging. His course lay from the headwaters of the Dordogne, with its deep-cut gorges, down to its meanderings in the Plains of Périgord, and by the valleys of its right bank tributaries, the Vézère, the Isle and the Dronne. He then crossed to the Garonne and the Adour, terminating his wanderings at Biarritz. Whilst not disregarding history, architecture, etc., his main interest is devoted to descriptions of scenery, and to personal experiences. A striking feature in these unchanging parts is the tradition of the *temps des Anglais* which seems to be credited in the native mind with too large a share of the destruction which the centuries have wrought.

The Oxford Country: Its Attractions and Associations described by several Authors. Collected and arranged by R. T. Günther. London: John Murray, 1912. *Price 7s. 6d. net.*

This anthology of the Oxford district comprises thirty-six papers, gathered mostly from scattered magazine articles, and not likely to be known to those who were not previously in touch with Oxford. But most of us are familiar with "The Scouring of the White Horse," and will be glad to renew acquaintance with the extract given. The articles are written with spirit and point, and wild life, hunting, geology, literary associations and history, all have their share.

It is not Oxford itself, with its Dons and Colleges, which is commemorated, but the country centred round it, and all likely to visit the country will do well to dip into this cheerful miscellany. The illustrations are in keeping with the text.

The Norfolk and Suffolk Coast. ("The County Coast Series.") By W. A. Dutt. Illustrated. London: T. Fisher Unwin, 1909. *Price 6s.*

It was natural for the editor of the series to turn to Mr. Dutt for this volume, and the choice has been justified. It is a capital book. Dealing only with a portion of the counties, it treats its subject from all points of view, but possibly local personalities and legends and the wild life of the district have first place. Those of us who hold as an article of faith that the great German descent will be made upon the East Anglian coast some month of July, will be interested in the old saying—

"He who would old England win,
Must at Weybourn Hoop begin."

Weybourn lies west of Cromer. A specialty of the county used to be the flocks of great bustards, which continued well into last century.

Probably no volume of the series will have such a tale to tell of the age-old combat between land and sea. It was the Romans who first successfully dyked

out the waters—under Cromwell another stand was made—and Great Yarmouth has arisen in what was once a wide estuary. Yet the sea can claim to have engulfed at least a score of parishes, and the Report of the recent Royal Commission does not tempt us to think that its ravages have ceased. Many incidents of the struggle are recorded in the book. Two small criticisms we have to make. The map does not give nearly all the places mentioned in the text. Mr. Dutt has failed to avoid the common misquotation—*Tempora mutantur, et nos*, etc.

The Passing of the Turkish Empire in Europe. By Captain B. Granville Baker. London: Seeley, Service, and Co., Ltd., 1913. *Price* 16*s. net.*

Captain Baker tells us that he wrote this volume in Constantinople while "the sound of firing was borne on the westerly wind" from the lines of Chatalja, and "a mighty empire was tottering to its fall"; and this may account for two things, one, an air of depression which runs through the book, and the other, the marks of haste in its composition. It is an ambitious work, for besides giving a very detailed account of Constantinople during the anxious days before the signing of the armistice on the 4th December last, it gives us a rapid survey of the origin and history of the Turks in Europe, of the modern Greeks, Bulgarians, Servians, and Montenegrins, and short notices of the Armenians, Albanians, and Vlacks who inhabit the Balkans. This is compressed into 328 pages, in which occur some repetitions. But not the less has Captain Baker produced an intensely interesting and instructive book. The history of the Turks is a sad one, *i.e.*, that of a once martial race, which rose rapidly to the possession of a wide and magnificent empire, and lost it by sheer incapacity to keep abreast of civilisation, the incapacity being mainly the result of the stagnating religion of Islam; but it is replete with thrilling episodes of romantic adventure and prowess on the side both of conqueror and conquered. Captain Baker's style is sometimes somewhat artificial and stilted, but he has made an honest study of the authorities on his subject: his narrative runs smoothly, and the interest never flags. He does not conceal his admiration of the Balkan allies, the deliberate prudence with which they made efficient preparations for their grand *coup*, and the heavy sacrifices they unhesitatingly made. Evidently he is of opinion that Great Britain has much to learn from the lessons of the war, but into this complicated and contentious question we do not need to follow him. We heartily commend the book to our readers.

A War Photographer in Thrace. By Herbert F. Baldwin. London: T. Fisher Unwin. *Price* 5*s. net.*

With the Conquered Turk. By Lionel James. London and Edinburgh: Thomas Nelson and Sons, 1913. *Price* 2*s. net.*

With the Turks in Thrace. By Ellis Ashmead-Bartlett. London: William Heinemann, 1913. *Price* 10*s. net.*

With the Victorious Bulgarians. By Lieutenant Hermenegild Wagner. London: Constable and Co., Ltd., 1913. *Price* 7*s.* 6*d. net.*

We have now before us a number of books written by war correspondents in the late campaign in the Balkans. Three are by Englishmen, worthy successors to William Russell and Arthur Forbes, and one by an Austrian officer. The whole campaign lasted only a few weeks, so there is a certain amount of sameness in the story told, and in the observations and criticisms of the correspondents. One and all agree in denouncing the obstacles thrown in the way of their seeing the facts, and especially the fighting for themselves, and for preventing them

sending accurate news to London ; and one and all had no hesitation in exerting their ingenuity to the utmost to outwit and evade the regulations imposed on them. In this they were very successful, but they did not succeed without running much personal risk. To be a successful war correspondent one has to have an iron physique, great personal courage, much fertility of resource, plenty of money, a working acquaintance with several languages, a facile pen, a fairly elastic conscience, and a capacity to live and work hard for two or three days on cigarettes, a few sardines, or a stick of chocolate. The first and foremost consideration is the interest of the paper the correspondent represents : when that is secured, the correspondent can be, and is, a good comrade and a kind friend to all and sundry, most especially to a brother correspondent in a fix. All these traits of character are well brought out in the volume before us, and we may add that the English writers have already won their literary spurs by various works which met with general acceptance.

The first of the four volumes is by Mr. Baldwin, the war photographer of the *Central News*, who got as far as Seidler and Karashtiran on the way to Lule Burgas, but was prevented from going farther. He gives a thrilling and life-like picture of the disastrous flight of the inhabitants and retreat of the Turkish army after the severe defeat of Lule Burgas. From Karashtiran he had an exciting journey to Chorlu, and thence to Constantinople. Here he and another war correspondent became possessed of "an interesting document" in "a curious way," which they prefer not to describe, and by means of it they managed to work their way back to Hademkeui, in the Chatalja lines and have an interview with the ill-fated Nizam Pasha, the commander-in-chief of the Turks. The story is well told. The illustrations of the book are very good, and there are many shrewd hints and suggestions which will be found very useful to photographers in similar expeditions in the future.

In his volume on the *Conquered Turk* Mr. Lionel James, an old campaigner and war correspondent of the *Times*, goes over a good deal of the same ground as Mr. Baldwin, and he has many caustic observations to make on the raw material of the troops sent to the front at first by the Turks, and the many and grave faults and deficiencies in the arrangements and administration, at least at the beginning of the campaign. He is not sparing of his criticism of the allies, who, according to his view, did not take full advantage of their first successes. He saw a good deal of the fighting, as he had a motor car which enabled him to get over the ground rather more quickly than some of the other war correspondents. Like Mr. Baldwin he was able to ingratiate himself with the Turkish officers, and his *savoir faire* and good-humoured audacity stood him in good stead in several tight places. The illustrations in this book are taken from the *Illustrated London News*.

The third volume—*With the Turks in Thrace*—is by Mr. Ashmead-Bartlett, the war correspondent of the *Daily Telegraph*. He was fortunate and skilful enough to outwit the Turkish authorities, and thus to have a good view of the all-important battle of Lule Burgas, of which he gives an excellent description. He also saw some of the fighting at the now famous lines of Chatalja, and at the attack on Rodosto. The book is considerably padded with disquisitions on a variety of subjects, *e.g.* the military history of the Turks, their unpreparedness for war, their lack of organisation, and so on ; but it is all very interesting reading, and the personal adventures and escapades are narrated with a happy swing and verve, so that although there is a certain amount of sameness in them the attention of the reader never flags. Mr. Ashmead-Bartlett also comments on the fact that the victorious Bulgarian army did not take full advantage

of the victory of Lule Burgas, which he attributes to their want of cavalry, and to exhaustion after the tremendous exertions of the previous week. This volume has many good illustrations from photographs by the author, and also from the *Daily Mirror*.

The fourth volume is by Lieutenant Wagner, the war correspondent of the Vienna *Reichspost*, who was deputed to watch and report the course of events at the Bulgarian headquarters. Although born in Vienna, Lieutenant Wagner grew up among the Balkans, speaks Bulgarian, Servian, and Bosnian fluently, is a *persona grata* in influential Bulgarian circles, and has had some experience of war conditions. This volume, like the others, is heavily padded. It contains only 285 pages, but it is page 125 before we reach the declaration of war. However, Lieutenant Wagner tells his story well, and lays his finger with unerring judgment on the deficiencies, weaknesses, and errors of the Turkish army and administration, which were apparently well known to the Bulgarian authorities long before the war began, and were counted upon as certain to affect gravely the issue of the campaign. Lieutenant Wagner, like his English *confrères*, gave the slip to those who were herding the war correspondents (and the hindrances and regulations in the Bulgarian camp seem to have been quite as irksome and rigorous as those in the Turkish, and indeed rather more difficult to evade), and he saw a good deal of the fighting. The accuracy of his telegrams to the *Reichspost* has been questioned, especially by Mr. Ashmead-Bartlett in his *With the Turks in Thrace*. But the narrative now before us is full of life and interest, and we heartily commend it to our readers. It is profusely illustrated with photographs, of which those of the leading Bulgarian statesmen and officers are particularly good, and there are several useful and instructive maps.

The Berwick and Lothian Coasts. By Ian C. Hannah. London: T. Fisher Unwin, 1913. *Price 6s. net.*

Written by the grandson of Dr. John Hannah, Rector of the Edinburgh Academy from 1847 to 1854, this book is full of interesting and valuable information, evidently lovingly collected. It opens with a description of Berwick-on-Tweed, and passes along the coast by St. Abb's Head, Cockburnspath, and Dunbar to North Berwick, Haddington, Portobello, and Craigmillar, and thus arrives at Edinburgh. It is difficult to say anything new of Edinburgh, but the author tells us that he "has spoken to sailors who had walked the streets and listened to the bands of the Eternal City herself without finding in her anything more remarkable than they might have discovered in Birmingham, over whom nevertheless Edinburgh had not failed to cast its spell." There is nothing of importance in the city which the author does not refer to with care and describe with erudition. He is also critical, as when he points out that St. Mary's Cathedral, although a noble Gothic pile, does not "harmonise with the spirit of the New Town" so much as the parish church of St. George, which is, however, "architecturally deplorable (even its dome is not seen within)." He remarks that "the New Town of Edinburgh is one of the extremely few instances in which the British have consented to lay out a new city on any definite plan, instead of reflecting in the crude irregularity of uninteresting streets, something of the policy of Drift that so possesses the national mind. At Washington we may get some idea of what London might have been had Wren's plan for rebuilding after the Great Fire got any further than paper." Descriptions of Leith, Queensferry, Linlithgow, and Borrowstounness, and sixty-five excellent illustrations by Mrs. Hannah throughout the volume, complete a work for which the dwellers in Berwickshire and the Lothians owe gratitude to the author.

The River of London. By Hilaire Belloc. London and Edinburgh : T. N. Foulis, 1912. *Price 5s. net.*

The River of London is the seafaring name for that part of the Thames by which seamen approach the great city, and Mr. Belloc essays to show in his book how the Thames has made London, and that London owes its very existence through the ages to the fact that it occupies the point nearest to the sea at which, under primitive conditions, it has been possible to span the river with a bridge, To the eastward of London the banks of the river are mud flats or marshes, on one side or other, and hence London became the collecting and distributing centre upon which roads converged from all the points of the compass. We thus have the geography of the lower Thames expressed in its sociological aspect : and the only parallel which Mr. Belloc allows to London and the Thames is that of Antwerp and the Scheldt, though he thinks that the Thames is "probably more destined to endure in its functions and commerce." The subject is in itself an attractive one, and it is treated by Mr. Belloc in such a way that the reader is impressed with the important part which the Thames has played in the making of London and of the southern counties of England. The influence of the lower Thames in early warfare has a chapter to itself. In his text Mr. Belloc, as we have said above, deals only with the lower Thames, but the illustrations, which are very beautiful reproductions of oil paintings by Mr. John Muirhead, take us as far upstream as Teddington and Pangbourne, and they add greatly to the charm of the book as a whole.

What I saw in Russia. By the Honourable Maurice Baring. London : Thomas Nelson and Sons, 1913. *Price 1s.*

Mr. Baring was the correspondent of the *Morning Post* in the Russo-Japanese War. In the first half of this little volume he gives us some vivid and stirring sketches of scenes in the war, more especially of the famous battles of Liaoyang and Shaho, of which he was a spectator. He bears eloquent testimony to the bravery of the Russians and the humanity of the Cossacks. The other half of the book has interesting sketches of life in Russia. He was present in Moscow during a part of the famous strike and during the religious ceremonies of Holy Week. He attended several sittings of the Duma in St. Petersburg and made acquaintance with several of the members, who apparently had no hesitation in speaking their minds to him very freely. There is also a good description of the well-known Nijni-Novgorod Fair and various scenes in the life of the peasantry. Mr. Baring is proficient in the Russian language, and this stood him in good stead everywhere. The volume is well worth reading.

Changing Russia. By Stephen Graham. London : John Lane, 1913. *Price 7s. 6d. net.*

In the *Scottish Geographical Magazine*, vol. xxviii. p. 151, we noticed Mr. Graham's *Undiscovered Russia*, and on p. 665 his *Tramp Sketches*. In the volume now before us we have another work on much the same lines, a charming description of a tramp along the shores of the Black Sea with excursions into the Ural Mountains and the Crimea. Mr. Graham is a delightful companion on such expeditions, having a keen eye for the beauties of nature, a marvellous knack of falling in with strange and interesting people, much skill in drawing out from them their inmost characteristics, and a graphic and lucid pen to portray the whole scene for the delectation of his readers. But in this volume he seems unable to refrain from politics, and his invective against commercialism and

the bourgeoisie is both bitter and extravagant. He is apparently obsessed with the idea that the one way to keep peace and prosperity in Russia is to preserve the peasantry in their present condition. "The hope," he says, "lies in the Tsar and his advisers, who are all conservatives, that they may truly conserve and keep the peasantry living simply and sweetly on the land, that they will not make any more commercial concessions when once the present pecuniary needs are satisfied. Of course if the Tsar and his advisers are not wise enough to save their people from commercialism, they will certainly bring ruin on their own heads. Every peasant brought into a factory or a mine or a railway is one man subtracted from the forces of the Tsar, and one added to the social revolutionary party." And of the bourgeoisie, or what he calls the "Lower Intelligentia," after a scathing description of their vulgarity and degradation, part of which it appears is their "miserable imitation of modern English life," he sums up his indictment in these words, "the curse of Russia, and, as the years go on, the increasing curse, is the bourgeoisie, the lower middle class, aware of itself articulately as the lower intelligentia. It is forming everywhere in the towns as a result of the commercial development of the nation. They are worse than the English middle class, worse than the Forsytes, because they wish to be considered national. They are of the race who 'limerick' and treasure-hunt, but are not occupied so innocently. They are unwilling to sacrifice anything, or to take any risks for political ends. Through them the *revolution* failed; they would have liked the revolution to have succeeded, but as they had not the faith of the true revolutionaries they waited to see who would win; selfish as it is possible to be, crass, heavy, ugly, unfaithful in marriage, unclean, impure, incapable apparently of understanding the good and the true in their neighbours and in life—such is the Russian bourgeois." No allowance is made for the inevitable results of the spread of education, and the fact that civilisation, with all that it implies, is penetrating gradually but surely throughout the Russian Empire, so that it is impossible for the peasantry and the middle classes to preserve the *status quo*. Moreover, if he gave a thought to the two countries where commercialism is most highly developed, and the middle classes, the bourgeoisie, is most powerful, Belgium and England, he would be fain to confess that the direful consequences which he so eloquently deprecates for Russia have not ensued, and are not in the least likely to ensue. Apart from these sinister and gloomy prognostications, this book will be welcomed by all who can enjoy a fresh breezy description of out-of-door life, in a strangely interesting country, exceedingly well told by an enthusiast who evidently enjoyed himself thoroughly, and succeeds admirably in visualising his tramp and his companions to his readers.

ASIA.

The European in India. By H. Harvey. London: Stanley Paul and Co., 1913. *Price* 12*s.* 6*d. net.*

This volume is divided into three sections, in each of which we have twenty sketches of men, women, and functions or scenes in ordinary Indian life. This way of portraying Europeans in India may be made very amusing and quite effective, and may convey a great deal of information and instruction alike to the European in India as to the European at home. But in this respect this volume completely fails: it deals with only a few phases of the least important part of life in India, and does not treat them with anything like adequacy. Twenty different types of men and as many of women are disposed of with an average of five pages to each, and the descriptions are misleading, because so defective.

For example, one would never gather from the descriptions of "the Military man," "the Uncovenanted Civilian," "the Railway man," and so on, that men have to work in India quite as hard as they do at home. The headings of the chapters on women are a sufficient indication of how they are depicted: "the Fast Married Woman," "the Scorpion," "the Passée Belle," and so on. As for the descriptions of Indian functions and station life, our readers will be wise to consult some of the scores of good Indian novels which may be found in any circulating library rather than the crude caricatures of this book.

A Wayfarer in China: Impressions of a Trip across West China and Mongolia. By ELIZABETH KENDALL. London: Constable and Co. *Price* 10*s.* 6*d. net.*

In the midst of the perennial supply of ordinary globe-trotter books dealing with China, it is refreshing to come upon one like Miss Kendall's which belongs to a different category, for in it we have an account of a very genuine piece of travel. Miss Kendall tells her story simply and unaffectedly, and we are sure that the reader will follow it with unflagging interest, from the author's start in Tongking in the extreme south, up through Western Yunnan and Szechuan, following the Tibetan border, down the Yangtsze from Chengtu to Hankow, thence by rail to Peking and Kalgan, and on across the great Mongolian desert until her arrival at the Trans-Siberian railway. The distance is, approximately, three thousand miles, much of it over country unknown to any European save the wandering missionary or explorer, and this Miss Kendall covered alone, and without escort beyond what was afforded by her faithful coolies, cook, and "boy," and by her Irish terrier, Jack, who appears to be nearly as great a "brick" as his mistress. Miss Kendall is not a novice at travel of this kind, and she knew how to face the discomforts inseparable from native inns and curious crowds, but she met with no serious difficulties and no adventures, and, at the end of her book, she pays a tribute to the good manners of the Chinese from whom she says she never met anything but courtesy and consideration. In another place she says "I have met bad manners in the Flowery Kingdom, but not among the natives." The journey was made in the last quiet months preceding the outbreak of the revolution in China, and, though Miss Kendall may not have made any fresh additions to geographical science, she has written a very charming book which we have no hesitation in commending to the attention of our readers.

AFRICA.

Three Years in the Libyan Desert: Travels, Discoveries, and Excavations of the Menas Expedition. (*Kaufmann Expedition.*) By J. C. EWALD FALLS, Member of the Expedition. Translated by ELIZABETH LEE. London: T. Fisher Unwin, 1913. *Price* 15*s. net.*

The writer of this narrative is a cousin of Father Kaufmann, the results of whose expedition to the Libyan desert, mainly the discovery of the buried city of Menas, are well known. While giving a general account of the treasures unearthed, the author devotes himself more particularly to a description of the organisation of the party, the engaging and victualling of the army of workmen, the incidents of camp life, the manners and customs of the Beduins, and various excursions from headquarters. It is rather curious that but for a casual reference here and there one would scarcely know that Egypt was in British hands. The illustrations are excellent, and there is an index, but one feels the want of a map. In the concluding chapter the author gives a favourable opinion

on the possibility of the reclamation of a large part of the desert of Libya by means of irrigation.

Camp and Tramp in African Wilds: A Record of Adventure, Impressions, and Experiences during many years spent among the Savage Tribes round Lake Tanganyika and in Central Africa. With a Description of Native Life, Character, and Customs. By E. Torday, Member of the Council of the Royal Anthropological Institute, etc. With 45 Illustrations and a Map. London: Seeley, Service and Co., Ltd., 1913. *Price* 16*s. net.*

Works on the Congo region are numerous, but this volume fills a niche of its own. As indicated in the title, the author has spent many years in Tropical Africa, and has had time to become intimately acquainted with the daily routine and customs of many savage tribes. It is clear that his character is such as not only to have commanded respect, but also to have invited confidences from his black neighbours, and his great influence over them, as well as the prestige his name enjoyed, are abundantly evident from several adventures modestly but graphically related. There are many excellent illustrations from photographs, but instead of the small scale map we should have preferred one of the author's own region giving all the place-names he uses in describing his journeys. The account of the customs of the various tribes is of interest, and will be valuable to the ethnologist.

A History of the Colonization of Africa by Alien Races. By Sir Harry H. Johnston, G.C.M.G., K.C.B., Hon. Sc.D. Cantab. Cambridge: At the University Press. *Price* 8*s. net.*

In a prefatory note to this book Sir Harry Johnston recalls to us that in 1898 he contributed to the Cambridge Historical Series a work on the History of African Colonisation which was reprinted with additions in 1905. But there has been much making of history in Africa since 1898, and even since 1905, and this more than justifies the decision of the Cambridge University Press that the whole book should be rewritten from beginning to end. How thoroughly this has been done may be gathered from the fact that the first edition contained only 288 pages, while the volume now before us with the appendices contains 471. The former maps have necessarily been thoroughly revised; a map of German Africa has been added; while a map showing the extent of the now practically extinct slave trade has been withdrawn. A comparison of the maps of these two editions is particularly interesting and instructive, as they show at a glance the important political changes which have taken place in the distribution of territory in Africa between the years 1898 and 1912. Of this new edition we have only to repeat what we said of the first edition (*S.G.M.*, vol. xv. p. 274) viz., that Sir Harry "has accomplished his task with thoroughness, and yet with clearness, and the reader is impressed with the well-balanced acumen and judiciousness with which he has selected what is really important, and rejected what is immaterial, in a huge mass of detail, which in undisciplined or incautious hands could hardly have failed to be unmanageable and obscure." As in the first edition, to some readers the most interesting chapters will be those on the slave trade, on Christian missions, and on the legion of distinguished explorers. The statesman, the politician, the philanthropist, and the economist will remark that, notwithstanding the many and important changes effected in Africa during the last fourteen years, Sir Harry has not seen sufficient grounds for departing much from the general conclusions as to the future of Africa which he formed in 1898. We most heartily commend this book to the perusal of our readers.

Reminiscences of a South African Pioneer. By William Charles Scully. London: T. Fisher Unwin, 1913. *Price* 10*s.* 6*d. net.*

In November last year (*S.G.M.*, vol. xxviii. p. 601) we noticed a book by Mr. Scully on Johannesburg. In the volume now before us we have the first instalment of his autobiography. He was born in Dublin in 1855, and when he was twelve years old his father decided to emigrate to Cape Colony, where he tried to make a living by farming, but without much success. Apparently the writer of this book began to carve out his own career at the early age of fourteen, when, after a futile attempt at sheep-farming he joined in the rush for the diamond fields at Kimberley, where on the whole he had somewhat bad luck, and just missed discovering the famous Kimberley mine. Here he met many men who were to figure prominently in the history of South Africa, such as Mr. Merriman, Mr. Becher, Mr. Barry, and the three brothers Rhodes, of whom some interesting anecdotes are given. Mr. Scully seems to have got disheartened with the diamond fields, and so, in 1873, he started for the gold fields in Lydenberg and Pilgrim's Creek and the adjacent lands, but here also he was not very successful. In 1874 he joined an expedition to Delagoa Bay, in the course of which he had some exciting adventures; and, in 1875, he with a Scottish friend, the claimant of a peerage, started off for Swaziland in search of a party of Australian explorers, regarding whom contradictory rumours of success and disaster had become prevalent. The two reached Swaziland and had various adventures with the native tribes, who were hospitable and kind to them, but very much the reverse to their two porters, who ultimately deserted them. This necessitated a return to Pilgrim's Rest. There Mr. Scully had a turn at working in a store, at which he was as unsuccessful as formerly, whereupon he resumed his prospecting for gold and succeeded in finding a good place, but his usual bad luck reappeared; the water supply failed, and he had to abandon what is now the Theta mine. Early in 1876 he started for Natal, passing Lydenberg, Laing's Nek, Majuba Hill, and Ladysmith to Durban, whence he got a passage to East London. Here he found most uncongenial employment in the service of a boating company, from which he was rescued by receiving an appointment as clerk to a resident magistrate. This commenced a career in the public service which lasted thirty-six years, and is to be the subject of a second volume of reminiscences, which should be every whit as interesting as the first one, which is well worth perusal as giving a vivid and graphic account of South Africa in the stirring days when the diamond and gold mines first attracted attention, and when roads and communications were few.

AMERICA.

Aborigines of South America. By Colonel George Earl Church. Edited by an old friend, Clements R. Markham, K.C.B. London: Chapman and Hall, Ltd., 1912. *Price* 10*s.* 6*d. net.*

All who read this erudite and interesting book will heartily agree with the regret expressed by the Editor, Sir Clements Markham, that it is unfinished, and at the same time they will be grateful to Colonel Church's widow, who has authorised the publication of as much as now appears. Colonel Church was well known to geographers on both sides of the Atlantic, and, as we learn from the biographical notice contributed by Sir Clements Markham, he was the first foreigner, not an English citizen, who was appointed Vice-President of the Royal Geographical Society. The story of his life has been condensed into the compass of a few pages, but they suffice to outline his brilliant career as

a soldier, a savant, a geographer, and a man of affairs. In this volume we have an account of the Aboriginal tribes of South America, of whom he made a patient study, for which he had exceptional opportunities. In connection with this he describes the localities in which they live now, and in which they have been driven to and fro by cruel and ruthless oppressors, of whom decidedly the worst were the Spaniards. He had made himself familiar with the history of these localities, and has enlivened this work with historical anecdotes and episodes, which throw a bright, and often a lurid, light on bygone times. The general impression produced is a sad one, and the sadness is not relieved by any certainty that oppression and cruelty are now things of the past. The story of the Putumayo, still being slowly and painfully expiscated, precludes any such feeling. Colonel Church's book is a very valuable contribution to our knowledge of the geography and ethnology of South America, and we heartily commend it to our readers.

Mexico and Her People of To-Day. By Nevin O. Winter. London: Cassell and Co., Ltd., 1913. *Price 7s. 6d. net.*

Mr. Winter has produced a very interesting book, in which he depicts the customs and characteristics of the modern Mexican, and gives an account of the mineral, industrial, and agricultural development of the country, in all of which branches of human activity he is convinced there is still scope for further improvement. He tells us in the preface that he has read all the leading books on Mexico and Mexican history, and has supplemented the knowledge thereby gained by traversing the country from north to south, and from the Atlantic to the Pacific, so that his information and advice to travellers contemplating a visit to that most romantic land are presumably reliable. The book is admirably illustrated.

Panama and What it Means. By John Foster Fraser. London: Cassell and Co., Ltd., 1913.

This is a very interesting book, and gives to the general and non-technical reader a very comprehensive and graphic description of the Panama Ship Canal, which will very shortly, it is expected, be completed and open for traffic. The author deals fully with the inception and history of the undertaking, he describes vividly the life and work of those engaged in its construction, the difficulties that have been encountered and been overcome, such as disease due to bad climate, labour troubles, turbulent rivers, landslips, etc. Specially interesting and instructive is the account of the difficulties that are being met with in making the deepest cutting on the line of the canal, the Culebra cut. Unfortunately, this cut is in comparatively soft material, and hence is subject to tremendous land slides, necessitating much of the excavation being done over and over again, adding greatly to the cost.

The author's visit to the country appears to have been made at an interesting period, when the works were nearing completion, and before the water was admitted to the canal, after which the nature and magnitude of the operations will be less in evidence. The illustrations, which are numerous and good, are not the least instructive part of the book.

Modern Chile. By W. H. Koebel. London: G. Bell and Sons, Ltd., 1913. *Price 10s. 6d. net.*

Mr. Koebel is a recognised authority on Argentina, and in this volume he sets forth his observations and impressions of its former enemy and present rival,

Chile. The two countries present very marked contrasts. Separated from Argentina by the Andes, Chile on the map looks like a strip of coast, and as a fact it has some 2600 miles of coast, and its greatest length inland is somewhere about 250 miles. But it is exceedingly rich both in agricultural and mineral wealth, and above all in the nitrates which it distributes to the marked benefit of farmers all over the world. The demand for these nitrates has been so great that the question was raised whether or not the supply might fail, and it is satisfactory to learn from Mr. Koebel that this is in the last degree unlikely. The real want in Chile is population, the present figure being only a little over three millions, and we must add there is also much want of great improvements in roads and means of communications generally. Some time ago we should have had to say that the first need of the country is peace, but happily this need no longer be said. Since the suicide of Balmaceda more than twenty years ago, there has been no constitutional crisis, and now that there remains no disputed boundary with Argentina, the chances of war seem very remote. Yet it is doubtful if the commercial development of the country will make much or rapid progress unless it is taken in hand by foreigners. The native Chilian is intensely conservative, and disinclined to the policy of what our American cousins call "hustle": but foreigners are making their appearance all over the country, and its development, though tardy, is sure to come. As it is, the statistics of imports and exports given by Mr. Koebel indicate a satisfactorily steady increase of trade. Mr. Koebel gives several graphic sketches of the principal towns, Valparaiso, Santiago, Concepcion, Valdivia, etc., and of the life and manners of the inhabitants, and also some excellent descriptions of country life and typical estates. The opening of the Panama Canal cannot fail to make a great difference to Chilian trade and commerce. This book will be found of great interest to merchants and engineers as well as to tourists. It is illustrated with photographs and has a good map.

The Land of the Peaks and the Pampas. By Jesse Page, F.R.G.S. London: The Religious Tract Society, 1913. *Price* 3*s.* 6*d. net.*

This book does not lend itself readily to review in a scientific geographical magazine. Its object is to make an earnest appeal to the Protestants of Europe and North America, to set before them the present spiritual destitution of the inhabitants of South America, to point out the dangers, social, religious, political and economical, which are incidental to such a situation, and to set forth what, in the opinion of the writer, is the only efficient remedy, viz., renewed and increased Protestant missionary efforts and propaganda. From beginning to end it is written from the Protestant point of view.

AUSTRALASIA.

The Land of the New Guinea Pygmies. By C. G. Rawling, C.I.E., F.R.G.S. London: Seeley, Service and Co., Ltd. *Price* 16*s. net.*

So little of the earth's surface remains a *terra incognita* that the reader turns with a fresh interest to Captain Rawling's account of his explorations in Dutch New Guinea and of its natives, who are still in the Stone Age. The expedition was organised by the British Ornithologists' Union, and the Royal Geographical Society of London contributed liberally to the funds for exploration and survey work. Mr. Walter Goodfellow was selected as leader of the party, Captain Rawling being put in charge of the survey work; and, later, when Mr. Goodfellow was invalided home, Captain Rawling took the command. The

provisioning of the expedition appears to have been faulty at the start, a large quantity of the stores having been taken over from the surplus of the Shackleton expedition, which, however suitable they may have been for the Antarctic, were quite unfit for use in New Guinea ; and a long period elapsed and much suffering was entailed before suitable stores were sent from England. The Dutch government afforded generous assistance, and an escort of forty Javanese troops, under the command of Lieutenant Cramer, was attached to the expedition. In addition to these, ten Gurkas were enlisted in India, as guards, and a large number of convicts from Java, as well as coolies, were taken to act as carriers. The sufferings endured in the forests and swamps told cruelly on the carriers, and as many as eighty or ninety per cent. of them died or were invalided. As Captain Rawling remarks, "this is the darkest side of the expedition, and it may be said of all journeys undertaken in New Guinea. . . . Of the four hundred Europeans and natives enlisted, only eleven lasted out till the end, a total period of fifteen months. Of the survivors four were Europeans, four were Gurkas, two were soldiers, and one a convict."

The forest land which lies between the sea and the foot of the mountains is nothing but a malarial bog, soaked by constant torrential rains, and swept by floods, and the coast natives are restricted to narrow strips of land bordering on the rivers. This part of New Guinea appears to merit the author's description of it as "a horrible country." The natives seem to have treated the members of the expedition better than might have been expected from such a low type of savages. For example, Captain Rawling tells us, "every one says the natives of New Guinea are blood-thirsty savages ; perhaps they are, but they were decent enough to us" ; and it is worthy of note that we find no record in this book of any serious attempt to attack the members of this expedition. This may have been due to the conciliatory attitude of the leaders, for there were frequent occasions when the lives of Captain Rawling and his companions were at the mercy of the savages. It is also noticeable that no mention is made of any instance of cannibalism.

Unfortunately, the expedition chose for their original landing-place the mouth of the crooked, shallow Mimika river, which, as later experience showed, takes its rise in the swamps of the jungle, in place of the Kamura river to the east, which, with its tributary the Wataikwa, proved to be navigable almost to the foot of the mountains. The mistake is not surprising, considering that this part of New Guinea was absolutely unknown ; but it cost the expedition very dear, in time, in life, and in suffering. However, Captain Rawling had his compensation in his great discovery of the pygmies, which he could not have made but for his attempt to penetrate to the hills from the west. He was able to visit the pygmies in one of their villages, and to get a number of pictures, together with notes on this interesting people, which form a valuable contribution to anthropology. A separate monograph on the pygmies from the pen of Mr. H. S. Harrison, B.Sc., F.R.A.I., forms one of the chapters in the book. Mr. Harrison considers them to be "true aborigines, primitive man," who have been driven to the fastnesses of the hills by invading tribes from the coast. The explorers saw the male pygmies only. Later, a special journey was made by two of the party, Dr. Marshall and Mr. Woolaston, to the village of Wamberini, in the hope of getting a sight of the women ; but the ladies themselves were too shy, or their men too jealous, and no bribe proved large enough to induce the pygmies to show their women-folk, so the party had to return disappointed.

After thirteen months of privation and toil, and after many obstacles to progress had been overcome, including the bridging of a dangerous river, with the help of a gallant Gurka havildar, who crossed at the peril of his life, Captain

Rawling and his companions succeeded in getting a view of the mountains which are mapped in the present volume. The explorers failed to reach the snows, but, apart from this, all the objects of the expedition were at length accomplished. A tribute of admiration is due to the author and his company for the courage and perseverance which enabled them to remain so long among the pestilential swamps of Dutch New Guinea, and to do so much for science. The help so generously rendered by the Netherlands government, who provided not only guards and bearers, but a gun vessel to carry the people to and fro, is gratefully acknowledged. Captain Rawling has given us a book of absorbing interest, and we can confidently recommend it to our readers.

GENERAL.

A History of Geographical Discovery in the Seventeenth and Eighteenth Centuries. By Edward Heawood, M.A. Cambridge: At the University Press, 1912. *Price* 12*s.* 6*d. net.*

A perusal of this the latest addition to the Cambridge Geographical Series cannot fail to impress the reader with admiration for the patience, industry, and erudition, which the learned Librarian to the Royal Geographical Society has brought to his task. Into a compass of less than four hundred pages he has condensed the story of exploration and research over the whole known world throughout the seventeenth and eighteenth centuries. In such a task he was compelled to weigh and select from his plethora of material; and it would be easy to criticise and cavil at details, *e.g.*, the space accorded to some particular explorers or events as compared with others. The author evinces a keen desire to do justice to all who have contributed, and indeed to those who have attempted to contribute to geographical knowledge, and for this cause he has made mention of expeditions, etc., more or less unfruitful, silence with regard to which would scarcely have detracted from the value of his review. This book is indeed a model of patient and judicious condensation, but the author has so handled his subject that the interest never flags, and the reader has only a feeling of regret, that limitations of space compel such short notices of famous explorers and travellers as Champlain, La Salle, Tasman, La Perouse, Cook, James Bruce, to name but a few. It is greatly to be hoped that a perusal of this book will send its readers to the study of the more detailed and classic authorities of whom there is no lack. The book is profusely illustrated with reproductions of quaint old maps and prints, very few of which are usually accessible to the ordinary reader.

Big Game Shooting in India, Burma, and Somaliland. By Colonel V. M. Stockley, late 16th Cavalry, Indian Army. London: Horace Cox, "Field" Office, 1913. *Price* 21*s. net.*

The sporting reminiscences of which this book is the record are spread over a period of nearly forty years, and they relate to many and varied climes, from the eternal snows of the high Himalayan passes to the redhot plains of Somaliland. The book is interesting as the record of the performances of a keen and successful sportsman, who evidently thoroughly enjoys fighting his battles over again, and is not given to boasting. Of course in such a varied experience there were plenty thrilling and exciting adventures and escapades, the excitement of which is not lost by the way they are described. On the other hand, similar adventures may be found in abundance in many of the scores of books which have been written on big game sport in all parts of the world within the last ten or twenty years. Colonel

Stockley is a keen observer of the habits of animals, and he gives interesting details of the measurements of his trophies. A novice, who is contemplating a shooting expedition to any of the places where the colonel has shot, would do well to go carefully over this book, in which he will find plenty useful hints and information which will serve him in good stead in his preparations, and also when he gets to his ground.

Common Sense in Foreign Policy. By Sir Harry Johnston, G.C.M.G. London: Smith, Elder, and Co., 1913. *Price* 2*s.* 6*d.*

It is not often that geographers have the privilege of seeing the world, not as it is, but as it ought to be. In this volume Sir Harry Johnston tells us what he considers "common sense," commends, and illustrates his opinions with eight maps of the Future drawn by himself and Dr. Bartholomew. The reason he gives for writing this book is "because—in comparison with our gigantic stake in the wise conduct of our foreign affairs—we are *in the mass* so lacking in a just appreciation of the lands and peoples outside the scope of the British Islands." At the same time, he admits that travel and colonisation and the discussion of foreign affairs in our newspapers are increasing our knowledge, so that "for ten Members of Parliament considered qualified thirty years ago for the discussion of foreign affairs in the House of Commons, there are now at least three hundred able to speak on the subject with acumen and representing the very decided views and interests of millions behind them."

In so original a work as this we must be prepared to be startled by some suggestions, such as that Germany might surrender her claims on Luxemburg and give up Metz in order to receive the French Congo and a predominant partnership in the administration of the Turkish empire. The author makes short work of existing European alliances, for he anticipates France's withdrawal "from the useless and unprofitable Russian alliance," and union with Italy and Spain in a Latin confederation, while a Central European alliance would include Germany, Austria, and the Balkan kingdoms, a suggestion regardless of the racial antipathy between Slav and Teuton.

The author thinks that Britain should cede Walfisch Bay to Germany, who would then undertake to withdraw from direct access to the Upper Zambezi. He reminds Germany, however, that she has done little as yet to make use of her African colonies. As to Europe, he suggests that Austria might let Italy have the Trentino, and Germany Trieste, Austria herself receiving Salonika in exchange, a suggestion which the results of the Balkan War seem absolutely to negative. Although the Magyars have ruled Hungary for a thousand years, the author declares that they "are an incongruity in Central Europe." He thinks Hungary should be "a practically independent country," but as Slavs, Rumanians, Germans, and Jews outnumber the Magyars in Hungary, its independence would not assure racial agreement. The author's suggestion that the Kingdom of Poland might be re-created as an independent state "to become a close ally of Germany and Austria," ignores the antagonism between German and Pole. Similarly, his settlement of the Finnish question by Russia granting independence to North and West Finland, and obtaining power to fortify the Aland Islands, means that Russia would be brought closer to Stockholm than the Swedes might like.

While suggestions such as these may be open to criticism, no one can fail to appreciate the wealth of historical, ethnical, and geographical knowledge displayed in this book and expressed with the lucidity and vivacity which mark all Sir Harry Johnston's writings.

THE SCOTTISH GEOGRAPHICAL MAGAZINE.

MALTHUS AND SOME RECENT CENSUS RETURNS.[1]

By George G. Chisholm, M.A., B.Sc.,
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(*With Plate.*)

When you did me the honour to invite me to lecture to your Section of the Royal Philosophical Society of Glasgow, I suggested as a subject the "Scottish Census of 1911," because I happened to be then engaged in the examination of the preliminary report of that census with a view to the preparation of some brief notes to accompany a map of the density of the population of Scotland, compiled by the Edinburgh Geographical Institute to illustrate the returns. Your council was good enough to accept that suggestion, but on proceeding to prepare my paper I found that I had planned it on so large a scale that all I could get within the limits of an hour is more suited to the title now adopted. The brief notes referred to appeared in the September number of the *Scottish Geographical Magazine* for 1911. The details there given showed that during the last intercensal period the growth of population in different parts of Scotland had been due principally to the influence of mining and fisheries, and that almost the only other causes of growth indicated were commerce and manufactures, and the attractions of health and pleasure resorts. The total population showed a reduction in the rate of increase as compared with the previous census from 11·1 to 6·4 per cent.

[1] A lecture delivered to the Royal Philosophical Society of Glasgow, and reprinted by permission from the *Bulletin* of the Geographical Society of Philadelphia, January 1913.

Some of these results, especially the diminished rate of increase of the total population, when first published, were received with a certain amount of disappointment and even dismay, not unmingled with hints that somebody or some class was to blame. And I propose, in the remainder of this paper, to consider how far these feelings are justified.

The cause of the disappointment is, no doubt, to be found in the fact that economic prosperity is almost universally believed to be an unquestionable good, and that a rapidly increasing population is an unmistakable sign of economic prosperity. This latter is an idea not confined to the man in the street, but occurs again and again in the writings of those who have considered the subject of population, from Malthus downwards. In the first edition of his *Essay on the Principle of Population*, Malthus says :[1] "There is not a truer criterion of the happiness and innocence of the people than the rapidity of their increase" (a statement that certainly goes far beyond the evidence that he has there adduced). And again : "The happiness of a country does not depend, absolutely, upon its poverty, or its riches, upon its youth, or its age, upon its being thinly, or fully inhabited, but upon the rapidity with which it is increasing."[2] And in our own times we have Sir Athelstane Baines stating in the article on population in the new edition of the *Encyclopædia Britannica* that "an increasing population is one of the most certain signs of the well-being of a community."

I am myself disposed to think, however, that if these statements are to be accepted, a very peculiar meaning must be given to the term "prosperous." It seems to be generally admitted that Ireland is, at the present time, one of the most prosperous parts of the British Isles, and yet there the population is still decreasing, and the birth-rate is the lowest of the four countries making up the United Kingdom. On the other hand, Russia seems to be the most striking example of a country with a rapidly increasing population. Taking the estimates of population for Russia given in the *Statesman's Year Book* for 1907, and comparing those with the Census returns of 1897, we find that population seems to have increased at the average rate of 1.67 per cent. per annum. And yet a Russian writer tells us "the general impoverishment of the Russian peasantry leaps to the eyes. If we ask ourselves how the peasant is fed, we find that the diet of himself and his family includes neither flesh, nor milk, nor eggs ; he eats only rye bread, and often not even that, with the addition of, at most, cabbage soup and weak brick tea."[3] All that I can admit to be certainly shown by an increasing population is that the conditions are such as to allow of the population multiplying in the circumstances in which they are willing to live and increase, which, I grant, is not admitting very much. It is an admission on all-fours with the statement that opium sends to sleep because it has a soporific virtue.

And with reference to the first of the authorities I have cited as to this idea of the relation between prosperity and an increasing population,

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[1] P. 108. [2] P. 137.

[3] Quoted in Andree's *Geographie des Welthandels*, 2nd ed., vol. i. p. 880, from Annenski's *Needs of the Village Communes.*

Malthus, I must point out that, so far as I am aware, the statements quoted belong only to the first edition of his *Essay*, and reconsideration led to their disappearance. In the third edition the paragraph, containing the first of the passages quoted from him, disappears altogether and the second is modified into this, "Other circumstances being the same it may be affirmed, that countries are populous according to the quantity of human food which they produce, or can acquire; and happy, according to the liberality with which this food is divided, or the quantity which a day's labour will purchase,"[1] a statement that seems to me much more satisfactory. I should add, too, that even the first edition shows the interpretation which was to be put on the statement made therein as to the happiness of a country depending upon the rapidity with which it is increasing inasmuch as he adds as an equivalent, "upon the degree in which the yearly increase of food approaches to the yearly increase of unrestricted population." That is, he looked upon the rapid increase of population merely as implying a rapid increase in the food supply, and this he took as a sign of the happiness of the population. In the sixth edition, we have this view given more explicitly, where he asks "if anything could be more desirable than the most rapid increase of population unaccompanied by vice and misery."[2] Obviously, Malthus, referring to "happiness," means the presence of the material conditions necessary for happiness, which, he had no need to be reminded, is a very different thing from happiness itself.

Holding this view, therefore, Malthus was under no temptation to regard an increase of population under all circumstances as a sign of "happiness," and, as is well known, he did not so regard it, either at the time that he was writing the first or any of the subsequent editions of his well-known *Essay*, which has evoked as much subsidiary literature as Adam Smith's *Wealth of Nations* or Darwin's *Origin of Species*. That literature is still growing in amount, and it is still worth while to inquire whether the views which he actually held are sound, and if so, whether they warrant us in regarding with disappointment the returns of the last Scottish Census, and, in that case, how far, and in what manner the feeling is well grounded.

Now, there is one statement which Malthus regarded throughout as fundamental and to which, accordingly, he appears to have consistently adhered amid all the changes of the various editions, which, during his lifetime, followed the first *Essay* of 1798; the statement that, while population tended to increase in a geometrical, food tended to increase in only an arithmetical ratio. Yet this statement I cannot but look upon as purely fanciful, one to which, indeed, it is hardly possible to attach any definite meaning consistent with facts that Malthus well knew. What is the meaning of "tendency"? Language is full of figurative expressions and the word "tend" in English is entirely figurative, and the figure, in this case, is so clear as to seem to leave no possibility of mistake. "Tend" is literally "to stretch," and "stretch" suggests or even implies a resisting force. Any prevailing movement

[1] Vol. i. p. 71. [2] Vol. ii. p. 450.

liable to counteraction thus naturally suggests the use of this metaphor. We do not say that the earth "tends" to move round the sun in an ellipse, but that it *does* so move; but we say that the snow on a mountain top *tends* to move downhill either as snow or ice, or that the dust of the desert *tends* to accumulate most deeply in the hollows, because, however much or often the wind may blow snow or dust upwards, gravity is always pulling it downwards. But, while the figure here is quite clear, I cannot imagine how any statement could be ventured on as to the precise degree or rate at which snow tends downwards or desert dust accumulates in hollows. We may also say that the earth, while it moves round the sun in an ellipse, "tends" to fall into the sun, and is only prevented from doing so by the counteracting tendency at each instant to fly off at a tangent; and, in this case, we may add that the tendency is to fall towards the sun at a rate corresponding to the law that the two masses attract one another with a force directly proportional to the mass, and inversely proportional to the square of the distance. Here we have an intelligible measure of a "tendency." What is meant is quite clear. It implies the statement of a universal law, whose operation can be fully overcome only by a force equal to that described as operating. But what parallel to this can we get in the statement of the law of population? Malthus shows us that, in fact, population increases in various cases at various rates—that, under very favourable circumstances, it can be shown to have doubled itself in even fifteen years; yet he does not take that as the rate at which it will double itself "if unchecked." He says we may safely assume from experience in the early years of the North American Colonies that, if unchecked, it will do so in twenty-five years—in any case, in a geometrical ratio, which must mean some definite ratio.

Well, let it be so. But what about food? Here we find no proviso "if unchecked," when he tells us that it will increase (of course, in any case, only through the labour of men) only in an arithmetical ratio. Yet he himself suggests a case in which it might be supposed that food would go on increasing at a geometrical ratio. He says, "when acre has been added to acre till all the fertile land is occupied"[1] a diminished rate of production must ensue, showing that, until then, he does not venture to make that assertion. Whether, therefore, it be population or food, we can imagine that, if the increase is unchecked (in which case we must take the term "unchecked," as applied to food production, to mean "not counteracted by greater hindrances to human labour") it might go on increasing at the same geometrical ratio.

But this objection to what Malthus puts forth as a fundamental fact, is, as regards the burden of his *Essay* merely trivial, superficial, inessential. The supposed fact about which he is so emphatic is not really fundamental. To make good his case, he was not required to show that population tends to increase in a geometrical and food in an arithmetical ratio. That way of putting the facts makes them, indeed, very plainly alarming, but his case would have been equally well estab-

[1] Third ed., vol. i. p. 8.

lished, if he could have shown that, while both population and food tend to increase at a geometrical ratio, population tends to increase at the rate of 2·5 per cent. per annum, food only at 2·4 per cent. per annum. The essential fact on which his case is built up is, indeed, stated in what follows after the words already quoted about the adding of acre to acre till all the fertile land is occupied. "The yearly increase of food must depend upon the melioration of the land already in possession. This is a stream, which, from the nature of all soils, instead of increasing, must be gradually diminishing. But population, could it be supplied with food, would go on with unexhausted vigour." This is nothing else than a statement of the law of diminishing returns, and it would have been better if Malthus had stated his case so, for his own statement of his case has led some people to suppose that he has been answered when some of the assertions made by him by way of corollary from his own way of stating his case have been proved to be wrong; as when it is shown that in certain cases, even in old countries, food supplies increase at an even more rapid rate than population. For instance, in a recent article on Japan, in the *Journal of the Royal Statistical Society*, there is a table showing that, if in the period 1888-92, population, and the production of rice, barley, wheat, and rye in the aggregate, in that country, be both taken at 100, in 1903-07 population had risen to 117·8, whereas the production of the cereals mentioned had increased to 120·8. It is notorious too that, in the latter part of the nineteenth century, at any rate, the food supply of the civilised countries of western Europe did actually increase at a more rapid rate than the population.

The fact to which Malthus draws attention had been recognised by others, as he well knew, again and again in many places from ancient times downwards. It was, in many cases, too obvious to be overlooked that increasing numbers might gradually increase the difficulty of providing food for the population. The merit of Malthus, and it seems to me to be a merit that cannot be questioned, was to call attention to and insist upon the universal importance of the relation between numbers and food supply to the wellbeing of the people. He adduced ample evidence to show that almost everywhere and at all times, population was pressing upon certain barriers, by the removal of which, it would be sure to increase at a more rapid rate than that actually observed. And he pointed out the nature of those barriers and showed how they operated in different cases.

But, in doing this, he came to differ from himself. While what seems to me the futile contention that population tends to increase in a geometrical and food only in an arithmetical ratio, runs through all the editions of the *Essay*, the first edition, as is well known, differs in a very important point from all the subsequent ones, with the result that the later editions take a quite opposite view of the possibilities of ameliorating the condition of the poorer classes of the people to that taken in the first. The first edition takes the view that all the checks that keep the actual population within the limits of the food supply, which, of course, it cannot pass beyond, may be reduced to the two heads "vice" and "misery," and that hence any permanent melioration

of the condition of the poorer classes, that is, of the great bulk of the community, is impossible. In the second and subsequent editions, however, he enumerates three checks to the undue increase of population, vice, misery, and moral restraint, and much space is devoted in these later editions to insisting on the importance which ought to be given to this last check, and to picture the improvements that might ensue from the more extended operation of this check as compared with the other two.

It is true that in the first edition he did not altogether overlook this third check. As he himself says, he had observed that, if some check to population must exist, it was better that this check should arise from a foresight of the difficulties attending a family and the fear of impending poverty, than from the actual presence of want and sickness.[1] But, in the first edition, he had classed this check, rather curiously perhaps, under the head of "misery."[2]

It is right, however, that we should take the second thoughts of Malthus on this subject and, if we do so, it seems to me that the whole of human history since his day has been such as to confirm his doctrines and to bring into relief their supreme importance,—the doctrines that population in its increase is always held back by certain barriers, that the checks which keep the population within those barriers may be classed as "vice," "misery," and "moral restraint," that population increases with greater or less rapidity when these barriers are pushed back, and with very remarkable rapidity, when they are almost entirely removed[3] (of their entire removal there is probably no example in history): that with like rapidity even old states recover from the ravages of war, pestilence, famine, or the convulsions of nature,[4] that the operations of these checks is not deferred till the world is filled up—a contingency that all writers on population recognise as an inevitable, though remote event—but "has existed in most countries ever since we have had any histories of mankind, and continues to exist at the present moment";[5] and that the only hope of the permanent amelioration of the condition of the bulk of mankind lies in the extension of the operation of the checks which come under the head of moral restraint. Some of his corollaries are also strikingly confirmed, as, that it is impossible to argue any future rate of increase from a present rate; that, as to America, we may be "perfectly sure, that population will not long continue to increase with the same rapidity as it did then"[6] that, even in a well-governed state, disastrous results may ensue from a sudden cessation of an extraordinary stimulus to wealth and population;[7] that those who live in the most frugal way are the nearest to a great disaster, and that where the great mass of the industry of a country is directed to the land, there may be, according to circumstances, instances in which the poor are in the best state, as well as others in which they

[1] Sixth ed., vol. ii. p. 256, apparently referring to first ed., p. 62.
[2] P. 108.
[3] First ed., p. 101.
[4] *Ibid.*, p. 109.
[5] Sixth ed., vol. ii. p. 7.
[6] First ed., p. 343.
[7] Sixth ed., vol. ii. pp. 329-31.

are in the worst state.[1] But, in spite of all these dismal forecasts, you may recognise that he was also right in foreseeing the possibility of a great increase of population in Great Britain, with greater comfort than was enjoyed by the mass of the people in his time.[2]

Let us consider some of these propositions individually. Malthus tells us that "under a government constructed upon the best and purest principles, and executed by men of the highest talents and integrity, the most squalid poverty and wretchedness might universally prevail from an inattention to the prudential check to population."[3] One knows not where to find a government which will meet the conditions which Malthus here sets down, but we may, I think, take the testimony of various enlightened foreign critics as proving that the British government of India is, at least, of a relatively high degree of excellence; and it is true that in quite recent years we have heard little of famine in India. Sir Theodore Morison, indeed, tells us that "the term 'famine,' which is still applied in India to a harvest failure, is now an anachronism and a misnomer. The true meaning of the word 'famine' according to the Oxford Dictionary is 'extreme and general scarcity of food.' This phenomenon has entirely passed away. Widespread death from starvation, which this word may be held to connote, has also ceased. . . . 'Famine' now means a prolonged period of unemployment, accompanied by dear food, and this is undoubtedly an economic calamity, which inflicts great hardship upon the working classes in India, as it would in any country."[4] Still, if this picture represents the truth now, we must remember that it is not very long since it was not true.

TABLE I.

Population of India.

	Population, Millions.		Variation, per Cent.	
	1901.	1911.	1901-1911.	Per Ann.
Bengal,	50·7	52·7	+ 3·8	+0·38
Bombay,	15·3	16·1	+ 5·2	+0·51
Burma,	10·5	12·1	+14·9	+1·40
Central Province and Berar,	12·0	13·9	+16·3	+1·52
Madras,	38·2	41·4	+ 8·3	+0·80
North-west Frontier Province,	2·0	2·2	+ 7·5	+0·73
Punjab,	20·3	20·0	- 1·8	-0·18
Sind,	3·2	3·5	+ 9·4	+0·91
Agra,	34·8	34·6	- 0·7	-0·07
Oudh,	12·	12·6	- 2·1	-0·21
Central India Agency,	8·5	9·4	+10·0	+0·96
Central Provinces States,	1·6	2·1	+29·8	+2·64

[1] Sixth ed., vol. ii. p. 119. [2] *Ibid.*, vol. ii. p. 293. [3] *Ibid.*, vol. ii. p. 323.
[4] *The Economic Transition in India*, pp. 120-1.

Even the figures of the last census, when examined in the light of recent history, bear testimony to the efficiency of famine, with its attendants, disease and pestilence, in putting a check on the growth of population, and then afterwards allowing it to grow again with renewed rapidity. The accompanying table gives some examples of the differences in the movement of population in some of the provinces of India, in all cases according to the present area of those provinces, between 1901-11; and the ratio of increase, it will be observed, differed very greatly, there being, in some cases, actual decrease. The decrease in the Punjab is worth inquiry inasmuch as it is a large and populous province, and one in which the growth of population has been favoured in recent years by the construction of irrigation canals.

"The Chenab and Jehlum canals, by rendering cultivable vast areas of waste, have been of incalculable help in reducing the pressure on the soil in the most thickly populated districts, and in increasing the productive power of the province. . . .

"Of recent years the immediate effects of scarcity on the population of the province have been practically negligible. The famine of 1899-1900, the most severe since annexation, affected the health of the people, so that many were unable to withstand disease which under more favourable circumstances might not have proved fatal. . . .

"Whether it will ever be possible to render the Punjab free from liability to famine is a difficult question at present to answer. . . .

"During famine cholera is most to be feared; but when famine ceases, after a plentiful monsoon, malaria, acting on a people whose vitality has been reduced by privation, claims a long tale of victims."[1]

And from the last "Moral and Material Progress of India," we learn that the average death-rate in the province in 1908 was 50·7, against a birth-rate of 41·8, followed in 1909 by a decline in the birth-rate to 35·1, with the explanation that this decline in the birth-rate was due to the fact that the people suffered severely from an epidemic of malaria in the autumn of 1908.

By way of contrast we may take the population of the Central Provinces and Berar, which showed the largest increase in population between the dates of the last two censuses. On inquiry into this case, we find that the high rate of increase expressed, in a large measure, rapid recovery from previous decline due to famine and disease. The decrease in Berar, shown in the census of 1901, was due to the famines of 1896-1897 and 1899-1900, and to the abnormally high mortality from disease in 1894-97, and in 1900. In the ten years preceding 1901, there was but one year which could be described as very favourable, and even then the rabi crops partially failed. We are also told that, between 1881-91, the population deduced from the vital statistics of the Central Provinces, when compared with those of the census returns, differed by only 50,000, while, in 1901, the corresponding difference amounted to 450,000. This, it is added, may be partly accounted for by emigration, but was mainly due to the deficient reporting of deaths

[1] *Imperial Gazetteer of India*, new edition, vol. xx. pp. 330-31.

in famine years. Other similar testimony is given in the *Gazetteer*. The population of these territories had decreased from 13·06 millions in 1891, to 11·99 millions (a decline of almost exactly a million) in 1901, when it was brought back to exactly the same figures as in 1881, so that the average rate of increase between 1891-1911 is equal to only 0·32 per cent. per annum.

On the other hand, the large increase in the case of Burma is quite normal. For Burma, as a whole, we cannot make comparisons going far back, but the rate of increase of population for 1901-11, given in the table, corresponds to an average increase of 1·42 per cent. per annum, which may be compared with the successive rates for Lower Burma according to the results of the censuses of 1872, 1881, 1891, and 1901, which are 3·48, 2·43, and 1·94 per cent. per annum, respectively. But here we have to do with a province which suffered from hundreds of years of misgovernment before it came into British possession, in consequence of which, when good government was established, there was plenty of cheap land to be had and the vast resources of the country came to be developed with great rapidity.

Let us now consider another country, the conditions of which are more similar to those in Scotland. The accompanying table shows for successive, but unequal periods, the rate of increase in Germany, and that of Scotland as a whole, the figures for Germany being, even in 1840, those for the present area of the German Empire. To make the figures for the two countries comparable, the rate of increase has, in every case, been expressed as the average rate of increase per cent. per annum.

TABLE II.

POPULATION OF GERMANY IN MILLIONS. INCREASE OF POPULATION PER CENT. PER ANNUM IN GERMANY AND SCOTLAND.

Germany.			Scotland.	
Year.	Population.	Increase.	Year.	Increase.
			1801-11	1·14
			1811-21	1·48
			1821-31	1·23
			1831-41	1·03
1840	32·8		1841-51	0·95
			1851-61	0·60
1871	41·1	0·72	1861-71	0·93
1885	46·9	0·95	1871-81	1·07
1890	49·4	1·06	1881-91	0·75
1900	56·4	1·32	1891-1901	1·06
1910	64·9	1·43	1901-11	0·62

With reference to these tables, I may point out first, that either of them may be taken as proving the observation of Malthus that it is impossible to argue the future rate of increase from the present, for both show that

the rate fluctuates from period to period. This may seem too familiar to need pointing out at all, and yet we find a distinguished French statistician, Mr. A. de Foville, comparing France with Germany, stating without qualification that it is probable that at the end of the present century, Germany will have a population of 120 millions or more, while France will not have 60 millions! If this forecast of Mr. de Foville as to the population of Germany at the end of the twentieth century proves to be fulfilled, it will be one of the most surprising things that that century will have to show. It is all the more remarkable that Mr. de Foville should have made this observation inasmuch as he makes it in an article [1] in which he is reviewing, not with disfavour, a forecast, by a Danish statistician, Professor Westergaard, of a totally different nature, Professor Westergaard anticipating that a conspicuous decline of the birth-rate will, by and by, appear in all civilised countries, that the growth of large European towns which was so marked a feature of the nineteenth century will be followed by a cessation of their growth, and an increase of population in the rural districts and the smaller towns of those districts.

Next, one may note that it is only since the latter part of last century that Germany has come to show any high rate of increase as compared with that of Scotland. Down to 1901, the rate of increase of population in Scotland was only once lower than the average in Germany between 1840-1871. It is true that the latter census was taken in a year when the increase of population must have been checked considerably by war; but, even making allowance for that, the calculated rate for the long period 1840-1871 must still have been a low one. I would lay special emphasis on this fact. It seems to show that the population in Germany was then pressing pretty severely against some barrier to its increase, and no very recondite investigation is required to reveal what that barrier was. At that time, the agriculture of the country was in a very backward condition, and the means of communication, especially by rail, very defective, and for the improvement of agricultural production better means of communication were absolutely necessary. But this was a barrier very easy to push back, once the modern methods, already widely in use in other countries, came to be applied, and they were pushed back all the more rapidly in consequence of the fact that Germany is rich in material resources for industrial development. Then the agricultural and manufacturing industries stimulated one another to such a degree that the average rate of increase has not merely been higher than Scotland has ever recorded, but higher for a decennial period than England (exclusive of Wales) has ever reached since 1821-31. Even for a quinquennial period, it may be mentioned, Germany has never attained the average reached by England (exclusive of Wales) in 1811-21 (1·68 per cent. per annum), and latterly the quinquennial censuses have been showing a declining rate.

And, unquestionably, the population in Germany, as in every other country, has throughout been more or less kept down by misery and vice, but, when one considers that the period for which quinquennial averages are given is one in which the death-rate had been going down,

[1] *Économiste français*, 30 November, 1907.

I think that we are safe in assuming that these checks have not been operating in an increasing proportion, and that the checks that have determined the fluctuations, have been chiefly those which have come under the head of "moral restraint." And what is true of Germany is true also of Scotland, with this geographical difference, that the growth of Scottish mining and manufactures is to a much less extent a stimulus to Scottish agriculture, than corresponding conditions are to that of Germany.

TABLE III.

GERMANY. INCREASE OF POPULATION PER CENT. PER ANNUM.

	1840-71.	1871-85.	1885-90.	1890-1900.	1900-10.
Prussia	0·87	1·00	1·11	1·98	1·54
East Prussia	0·89	0·52	−0·02	0·19	0·23
Brandenburg	1·40	1·77	2·41	1·95	2·12
Schleswig-Holstein	0·60	1·04	1·18	1·30	1·56
Westphalia	0·81	1·57	1·93	2·76	2·61
Hesse-Nassau	0·32	0·93	0·87	1·32	1·58
Rhine Province	1·03	1·40	1·61	2·03	2·14
Bavaria	0·36	0·80	0·62	1·00	1·08
Saxony	1·30	1·59	1·91	1·84	1·35
Würtemberg	0·32	0·67	0·40	0·63	1·17
Baden	0·39	0·66	0·68	1·20	1·38
Hesse	0·30	0·83	0·73	1·21	1·36
Mecklenburg-Schwerin	0·39	0·23	0·09	0·51	0·51
Alsace-Lorraine	0·10	0·07	0·48	0·69	0·86
German Empire	0·72	0·95	1·06	1·32	1·43

Similar results are reached when we look into details. Here are some rates of increase of population in recent periods for different parts of Germany. Geographical conditions in relation to the present state of industry here also obviously have an important influence on the rate of increase, and the differences are not unlike those which we find in Scotland. The lowest rates of increase, at least in recent years, are shown in the agricultural provinces of East Prussia and Mecklenburg-Schwerin. In one of these, you will notice, the rate is quite insignificant, and in one period there was even a decline. Notwithstanding the great improvement that has gone on in German agriculture, and a great increase in the number of the population employed in agriculture, there has been, as in Scotland and England, an actual decline of population in many of the rural districts of Germany. What is called a "landflight" in Germany is known there just as it is here. It is not very wonderful, for in old countries improvement in agriculture means in a large measure the substitution of machinery for men, as in a new country it means in a large measure the addition of men to machinery. And in this connection, returning again to Mr. de Foville's anticipation as to the population of Germany at the end of the twentieth century, I may mention that, while a slackening of the birth-rate in the towns of Germany has, for some years, been subject for remark, the diminished fruitfulness of marriages

in the country districts of Germany is now beginning to attract attention. It is the subject of an article in the *Zeitschrift fur Socialwissenschaft* for December of last year. The really high rates of increase, amounting to a maximum of 2·76, are in the mining and manufacturing provinces of Westphalia and the Rhine. The other great manufacturing region, the kingdom of Saxony, it will be noted, has never shown so rapid a rate of increase as the two others have since 1890, and Saxony since the period 1885-90 has shown a declining rate of increase.

In comparing Scottish counties with German provinces we are indeed comparing small things with great, still the comparison is not uninstructive. To facilitate that comparison, the accompanying diagram, for the idea, as well as for the preparation of which, I am indebted to my university assistant, Miss A. B. Lennie, M.A., B.Sc., has been drawn up. Looking at this diagram, we may notice a regular decline in the rate of increase of population in most of the non-manufacturing counties since 1871, but the great majority of those counties reached their maximum rate in the period 1861-71 or before it. But some of the non-manufacturing counties, Elgin, Banff, and Kincardineshire, have maintained the same increase to the end, probably, as already stated, through the development of the fishing industry. Special comment may be made on two counties, Argyllshire and Perthshire, whose decline began specially early, in both cases in the period 1831-41, and two, which show specially notable advances, Fife, in which there was on the whole a declining rate from 1851 to 1861, when the rate was only ·08 per cent. and then a steady, and, even latterly, rapid rise to 22·3 per cent. in 1901-11, and Selkirk, which showed a rapid increase in the two periods, 1861-71 and 1871-81. In the case of Argyllshire, there probably can be little doubt that what brought about the early decline of population was the rapid growth of the city of Glasgow, which, of course, attracted population from many parts, and no county was more favourably situated for supplying a population than the county of Argyll. In Perthshire, we probably see the result of a similar attraction due to the growth of the manufacturing towns of Dundee and Arbroath. As for the peculiarly rapid growth of Selkirkshire, culminating in the period 1871-81, it is necessary to note that this growth is almost entirely confined to the manufacturing towns, Galashiels accounting for the greater part of it. In the table in the census report, the increase of population for that county is represented as having been as much as 82½ per cent., but this arises from the inclusion of the Roxburghshire portion of Galashiels in the county of Selkirk in the population of 1881, but not in the population of 1871. In the diagram, for the sake of making the comparison more instructive, the population of that part of Galashiels that lies upon the left bank of the Gala, has been included in the Selkirkshire portion and not that of the county of Roxburgh, from 1861 onwards. Even then, a rapid increase is noted in the two periods, to which attention has just been called; and the explanation of that rapid increase is not to be found in this county any more than in any other county in any growth of the rural population, but solely in the fact that there was a very steady advance in the woollen industries of the Scottish

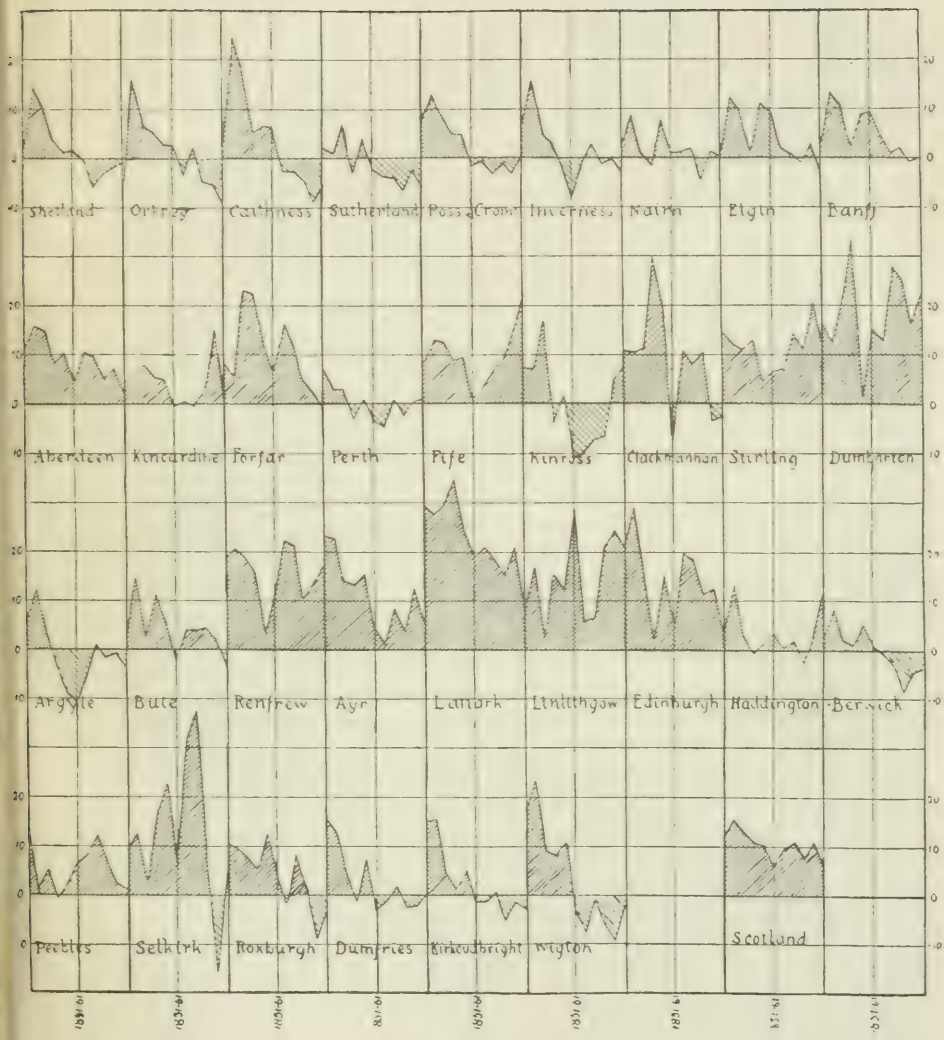

Diagram showing changes in Rate of Increase of Population in Counties of Scotland.

borders generally, down to the date 1872, which was the culminating year as regards the quantity of goods produced. There can be little doubt that the Franco German war, which interfered with the industry of two of the most important woollen manufacturing countries on the continent of Europe, gave excessive temporary stimulus to that industry in this country, and, therefore, may be looked upon as a contributory cause of the slackening of the rate of increase and the decline which ultimately followed. The rapid and growing rate of increase of population in Fife since 1861 is a sign amongst other things of one way in which the recent prosperity of Germany has influenced this country. The growth of the mining industry in Fife is promoted in a large measure by the rapidly rising demand for coal in the Baltic as well as in other parts of Europe.

But with all that Malthus foresaw, there were certain important facts bearing upon the growth of population since his time which Malthus did not foresee, and could not possibly have foreseen. No more than Adam Smith did Malthus foresee the enormous revolution that was going to be wrought by railways. Unlike Adam Smith, he lived into the railway era. The last edition of his *Essay* was published in 1826, the year after the opening of the Stockton-Darlington line, which may be called the pioneer railway of the world. But neither railways nor steamships are mentioned by him, and, in any case, it was not to be expected that he would be able to foresee the marvellous degree to which railways have cheapened the carriage of produce as bulky as the most essential of our food-stuffs. He understood the manner in which commerce may put into the hands of the people in one country command of labour in other countries, but he could not foresee the extraordinary extent to which the accumulation of capital, and its investment in foreign countries, would give the inhabitants of one little country command of the labour of millions in the most distant regions of the world. But, if he could not foresee the way in which railways could make the plains of America available for the food-supplies of this country, it may be contended that he did foresee what would happen in America in such an event. "In a country," he says, "where there is an abundance of good land, where there are no difficulties in the way of its purchase and distribution and where there is a foreign vent for raw produce, both the profits of stock and the wages of labour will be high. These high profits and high wages, if habits of economy pretty generally prevail, will furnish the means of a rapid accumulation of capital, and a great and continued demand for labour, while the rapid increase of population which will ensue will maintain undiminished the demand for produce, and check the fall of profits. . . . America affords a practical instance of the agricultural system in a state, the most favourable to the condition of the labouring classes. . . . They have been able to command an unusual quantity of the necessaries of life, and the progress of population has been unusually rapid."[1] It is enough, perhaps, by way of comment upon this, to draw attention to the manner in which that is illustrated by the accompanying

[1] Sixth ed., vol. ii. pp. 119-21.

table, showing the rates of increase of population in different parts of the United States at different periods.

TABLE V.

UNITED STATES. POPULATION (IN MILLIONS) AND INCREASE PER CENT. PER ANNUM.

Division.	1790.	1840.	1860.	1890.	1900.	1910.
1. N. Atlantic Div.	2·0	6·8	10·6	17·4	21·0	25·9
Rate of Incr.		2·50	2·27	1·67	1·92	2·08
2. S. Atlantic Div.	1·9	3·9	5·4	8·9	10·4	12·2
Rate of Incr.		1·52	1·57	1·69	1·66	1·56
3. N. Central Div.	—	3·3	9·1	22·4	26·3	29·9
Rate of Incr.		—	5·12	3·04	1·63	1·27
4. S. Central Div.	0·1	3·0	5·8	11·0	14·1	17·2
Rate of Incr.		—	—	2·17	2·34	2·02
5. Western Div.	—	—	0·6	3·0	4·1	6·8
Rate of Incr.		—	—	5·43	2·81	5·25
Total[1] . . .	3·9	17·1	31·4	62·6	76·0	92·0
Rate of Increase .		—	—	2·32	1·90	1·93

Even in Malthus's day this rapid increase of population depended upon the small amount of labour with which increased supplies of food could be produced, and, since his time, the application of machinery to food production has still further diminished, and that, in a great degree, the amount of labour required for production on the fields, while the improved means of transport has been reducing that amount as required for its production, in the sense in which that word is used by economists, on the markets of old countries across the ocean.

So far has this proceeded that there is a tendency to suppose that food production does not, in any way, act as a check upon the increase of population in old countries with an advanced industry; that for them there is sure to be enough, whatever countries go short. But to those who hold this view, Malthus would have pointed out, first, that home industry can give us the power of purchasing from abroad only in so far as we are able to sell abroad, and the extent of our sales, is, in the last resort, dependent upon the food supply somewhere. In years of famine, India can buy from us fewer cottons, and, as is well known, this great British industry, which, on the balance of years, is a very profitable one, is one that is characterised by marked fluctuations of profit and loss. A highly organised industry in an advanced manufacturing country gives employment to numbers of people with various degrees of ability and training and character, but, in the long run, the number of people for whom food, with a small surplus, is afforded in India, China, and other countries, is an important factor in determining how many of each grade can be employed in this country.

But, secondly, Malthus would have pointed out that, however favour-

[1] Exclusive of Alaska.

able conditions may be at any given time to the more extended utilisation of the food-producing areas of the world, these areas are, after all, as distinctly limited as those of any one country. The world is larger than our little island, but no more extensible. We are justified in arguing from what we see going on around us, that a time must come when the increase of food production all over the world will involve more labour, as it has come to do in one country after another. No doubt this result may be prevented by a variety of possibilities which we have no means of foreseeing, but it is only experience that can offer us probabilities.

A more plausible consideration is that the extension of the area of food supply has this effect at least, that so long as it continues to extend, it does not matter where industry is carried on. The products of industry will always ensure the supply of food and other necessaries. Railways and steamships, we are told, have annihilated distance. But this epigrammatic way of expressing an unquestionably remarkable development of the means of transport in modern times is apt to be taken too literally. The truth is, that the local market is still a powerful factor in stimulating the growth of nearly all industries. It is, indeed, a truth that is apt to be overlooked at present owing to the way in which the growth of the world, as a whole, tends to conceal the degree in which our hold on foreign or rather external markets is getting encroached on by the more rapid growth of the home industries in those markets. In new countries, without doubt, there are great difficulties in the way of establishing manufacturing industries, and especially those which involve a high degree of organisation. The population is too scattered to form a sufficiently large local market: the supply of skilled labour is inadequate; capital is dear. But skilled labour becomes more plentiful and capital becomes cheaper, and the demand of the local market, which from the first counts for something, becomes steadily greater as population increases from natural causes. Besides, if it is of no moment where industry is carried on, provided people will only work, why have Distress Committees in Great Britain to make such reports as that "there are still, however, a very considerable number of willing and able workers who are unable to procure situations"?

In new countries, or at least in the new parts of new countries, this difficulty does not present itself. There the abundance of free land gives a value to mere manual labour which ensures to it a high degree of mobility, at least if the labourer is endowed with only a modicum of foresight. As a Winnipeg waiter, who, before he went out to Canada, earned fifteen shillings a week in one of the eastern counties of England, expressed it to me, "Now I can go where I like, east, west, north, or south," and the buoyancy of feeling revealed by this statement is what seems to be common to all the young and strong throughout the north-west of Canada.

It was considerations such as those above indicated that induced Malthus to declare himself no very determined friend to "trade and manufactures." But, in the later editions, while he elaborated, even more fully, his views as to the evils of manufactures, he lays great stress

on the fact that "manufactures, by inspiring a taste for comforts, tend to promote a favourable change in the [habits of the labouring poor], and in this way, perhaps, counterbalance all other disadvantages."[1] This is the point to which he again and again returns as that which is most likely to render generally operative the check of moral restraint, by which alone he looks forward to a general improvement in the condition of humanity as at least a possibility if not a probability. In one enumeration of the peculiar advantages of Great Britain, after mentioning the excellence of her soil, the comparative steadiness of her climate, the happiness of her insular situation, he adds as the last of those advantages, "above all, throughout a very large class of people, a decided taste for the conveniences and comforts of life, a strong desire of bettering their condition (that master-spring of public prosperity) and, in consequence, a most laudable spirit of industry and foresight are observed to prevail."[2] And with England he contrasts France, as to which he says, "With all her advantages of situation and climate, the tendency to population is so great, and the want of foresight among the lower classes of the people so remarkable, that, if poor-laws were established, the landed property would soon sink under the burden, and the wretchedness of the people at the same time but increase"[3]—another reminder of the impossibility of foreseeing a future rate of increase of population from the rate at any given time.

If Malthus had lived at the present day he would probably, in considering the unquestionable increase of economic wellbeing in the great bulk of the people in this country, have pointed out, that the tendency of legislation also had been, in some respects, to retard the rate of increase of the population. It is, perhaps, not without significance that Malthus speaks of a "standard of wretchedness"[4] as placing a limit on the increase of population. Our phrase for the same thing is the "standard of living," apparently a recognition of the fact that such a standard has come to operate above the standard of wretchedness. Among the causes which have tended to raise that standard may be included, I think, the Factory Acts, as to the operation of which it is not impossible that both the supporters and opponents of those Acts were, in a measure, right, the supporters, in thinking that they would tend to raise the economic level of the workers, the opponents in thinking they would check, to some extent, the growth of British industries—a supposition not disproved by the very rapid expansion of those industries in spite of the Factory Acts.

The removal of the restrictions on the action of trade unions may be credited with the same tendencies, for, so far as union action is able to maintain a higher level of wages or better conditions of another kind, than would otherwise have obtained, it can only be, on the one hand, by restricting the supply of labour in a particular industry and, on the other hand, by compelling the leaders of industry to restrict their employment of capital to those branches of the industry in which higher

[1] Third ed., vol. ii. p. 206.
[2] Sixth ed., vol. ii. p. 346.
[3] *Ibid.*, p. 348.
[4] *Ibid.*, p. 359.

wages can be earned. The endeavours of trade unions to restrict the number of apprentices, and to drive non-unionists out of employment, are also conscious or unconscious efforts to keep up the standard by keeping down the numbers. Industries or branches of industry that do not come up to the British standard of living tend to die out. Probably the dominating tendency of the Education Acts in this connection also is to retard the growth of population through its effect on the standard of living, even though their effect in promoting industry and population, their necessity as a defence of industry in competition with other countries, can hardly be called in question. In making the suggestion of a possible retarding effect, ascribable, on the balance of tendencies, to our Education Acts, I shall probably be told, as we are so often nowadays told, whether appropriately or inappropriately, to look to the example of Germany. Germany, it will be said, is one of the best educated countries in the world, and has been in that position longer, perhaps, than any other country, and yet its population is still increasing with striking rapidity. True, but if I look at Germany, I should like to see, if I could, all the relevant facts, and I think, at least, that it is not irrelevant to refer once more to what I believe to be the fact, that one essential condition of the remarkably rapid advance that Germany has made since the early seventies of last century was the very backward state of German agriculture at that time.

I have wandered far away from Scotland, but, if I now return to our own country, I trust I shall be able to show that I have not wandered without reason. We have seen that elsewhere population increases or diminishes in different parts of the country, at varying rates, and that these rates depend, in the long run, on the extent of the food supply somewhere, and, directly, in civilised countries, to a large extent on the standard of living which the different classes endeavour to maintain. If the maintenance of this standard involves a diminished rate of increase of population, the fact that this is so is no doubt matter for regret, but it may be a matter for which no one is responsible. And, if it is so, I cannot say that I see anything to regret in the fact that that degree of moral restraint is observed which is necessary to maintain the standard. As things are, it would probably be easy enough for Scotland as a whole to recover the rate of increase which she showed between 1891 and 1901. Looking to the growing importance of the mining industry, one may say that a willingness on the part of the miners to accept 3d. a ton less wages would go a long way to bring that about, provided, of course, that there was a corresponding willingness in other branches of British industry, without which there could really be no such reduction in that of mining. There would then soon be an increased demand for Scottish coal, and an increased demand for labour, and that demand would, no doubt, speedily be supplied. But, if it were to be supplied in this way, I wonder whether there is any one here who would look upon that mode of increasing population with any degree of satisfaction. But there may be more wholesome means of increasing the population, possibly by the improvement of Scottish agriculture, and all, I should think, will be agreed that, if that could be done, without

lowering the standard of living for the classes concerned, it is much to be desired. Still, even with reference to this, it is important to bear in mind the fact mentioned by Malthus, that it is possible for an agricultural population to be in the worst state as well as in the best, and I may here point out that Malthus was one of those who foresaw the possibility of disaster in Ireland from an unrestrained increase of an agricultural population long before the famine took place. Referring to Arthur Young's project for improving the condition of the people by the more extended use of milk and potatoes in their diet, he says, "when, from the increasing population, and diminishing sources of subsistence, the average growth of potatoes was not more than the average consumption, a scarcity of potatoes would be, in every respect, as probable as a scarcity of wheat at present; and, when it did arrive, it would be beyond all comparison more dreadful"[1]—a Cassandra prophecy uttered in 1826, leaving twenty years for scorn before its fulfilment. Indirectly, even more than directly, it may be also possible to promote the growth of a numerous, strong, and healthy population, by a scientific cultivation of forestry in Scotland, but, in any case, it appears to me that for the present day, as for the time when Malthus wrote, the sound conclusion is as he puts it: "It is clearly the duty of each individual not to marry till he has a prospect of supporting his children"; while, however, we add with him, that it is "at the same time to be wished that he should retain, undiminished, his desire of marriage, in order that he may exert himself to realize this prospect, and be stimulated to make provision for the support of greater numbers."[2]

Still, we cannot overlook the fact that, if the economic conditions, to which Malthus calls attention, do tend to bring about a healthy degree of moral restraint in the great bulk of the community, there is still a large section of the population in whom the motives that bring about moral restraint do not and, perhaps, in the present circumstances, cannot be expected to act. They are born and brought up in conditions which give them nothing to strive for, except, perhaps on the part of those who, even in such surroundings, may be endowed with exceptional force of character. With regard, also, to this section of the population, it seems to me that the problem is still as it was stated by Malthus: "How to provide for those who are in want, in such a manner as to prevent a continual increase of their numbers, and of the proportion which they bear to the whole society"[3]—not "how to provide in the cheapest and best manner for a given number of people. If this had been the sole question it would never have taken so many hundred years to resolve."[4] And, probably, it is the most important result of the labours of that keen thinker, whose sympathy with the poor haunted him like a passion and governed the labour of his whole life, that that idea has, more or less, entered the minds of nearly all social reformers, whether they accept the doctrines of Malthus, or profess to denounce them. Whatever means can be taken that will answer to the "touchstone" of Malthus, that they shall tend to increase the foresight of the classes

[1] Sixth ed., vol. ii. p. 388. [2] *Ibid.*, p. 269. [3] *Ibid.*, p. 395. [4] *Ibid.*, p. 392.

concerned will be looked on with approval by all, but there still remains a large class, whom motives cannot reach, the feeble-minded, the hopelessly degenerate, the criminally idle: but with regard to these classes I will merely say that it is very significant that from so many sides, representing different tendencies of thought, the demand is daily becoming stronger that these classes should be isolated and not allowed to multiply to the detriment of the community.

GEOGRAPHY IN SCOTLAND SINCE 1889.

A Report presented to the Tenth International Geographical Congress at Rome, March-April 1913.

By Marion I. Newbigin, D.Sc., Editor of the *Scottish Geographical Magazine*.

In the year 1889, Mr. A. Silva White, then Secretary of the Royal Scottish Geographical Society, and Editor of its *Magazine*, presented to the Fourth International Geographical Congress at Paris a *Report* on the Achievements of Scotsmen during the Nineteenth Century in the Fields of Geographical Exploration and Research (see *S.G.M.*, vol. v., p. 480 *et seq.*). This Report, covering as it did a period of nearly ninety years, was of a very comprehensive nature, and summarised the work of Scotsmen both at home and abroad. The present Report, which refers only to a period of some twenty-three years, and brings the previous one up to date, must necessarily be shorter.

We may note in the first instance that during this period geography has followed in Scotland much the same lines as in other countries. As, in broad outline, the surface of the globe, at least in lower latitudes, was tolerably well known before the beginning of the period, there has been, naturally, everywhere a diminution in the amount of exploration done. More attention has therefore been devoted to the detailed study of the homeland, and to the investigation of special problems relating to the geography of Scotland. Thus we have had, as will be noted directly, investigations of the Scottish Lochs, of the vegetation of the country, and so forth. In devoting special attention to such detailed problems Scotland has followed the example of other countries within recent years.

In the second place, in Scotland, as elsewhere, the fact that the land surfaces of the earth are now tolerably well known has led to an increasing concentration of attention upon the ocean, with the result that many papers have been published and many investigations conducted on problems connected with Oceanography.

Finally, as high latitudes constitute the least-known part of the surface, we find that Scotland has taken her full share in Polar Exploration during the last two decades.

Again, in Scotland, as elsewhere, great interest has been taken in

recent years in methods of improving Geographical Education, and in this, as in the fields of research, considerable progress has been made.

I. Investigations in Scotland.—After this brief introduction we may take up the different subjects in order, beginning with research in the homeland. Of such investigations the most elaborate has been the *Survey of Scottish Lochs*, conducted under the direction of Sir John Murray and Mr. Laurence Pullar. This Survey has not only yielded a great mass of scientific material, but it has also served as a training school for a number of the younger investigators, and has thus had a direct as well as an indirect importance in connection with geography in Scotland.

The inception of the scheme may be briefly noted. In 1883 the Royal Society of Edinburgh wrote a letter to the Secretary of the Treasury, pointing out the desirability of having a bathymetrical survey made of at least some of the more interesting of the Scottish Lochs. This letter was followed by one from the Royal Society at London, and by other efforts to bring pressure upon the Government of the day. These efforts were ineffective, and in the year 1900 Sir John Murray and Mr. Fred Pullar published a first article containing observations made by them on the depth, temperature, life and so forth of the Lochs of the Trossachs and Callander District. This article was copiously illustrated with maps and figures, and was based upon the personal observations of the two gentlemen named: geological notes by Messrs. Horne and Peach, of the Geological Survey, being added, together with a geological map. Two further instalments were published during the following year, but the work was interrupted by the tragic death of Mr. Fred Pullar, who was drowned while endeavouring to save the lives of others, in the early spring of 1901. The early investigations had owed much to Mr. Pullar's mechanical skill as shown in the invention and modification of sounding-apparatus, and his father, Mr. Laurence Pullar, resolved that the Survey should be completed as a memorial to his son. The successive papers appeared in the *Geographical Journal* and in the *Scottish Geographical Magazine*, before their final issue in six volumes under the title of *Bathymetrical Survey of the Scottish Fresh-water Lochs* (1910). These volumes, in addition to containing the detailed results, soundings, temperatures, and so forth, and also papers on the fauna and flora of the lakes, and on the geology of the regions in which they lie, include also a number of general papers which render the whole monograph to a large extent a summary of our present knowledge of the subject of lake study. The beautiful maps which accompany it are the work of Dr. J. G. Bartholomew.

As already suggested, the Survey also stimulated research in a number of directions. One of the most important of the subsidiary problems raised was that of seiches and other oscillations of lake surfaces. The late Prof. Chrystal of Edinburgh University and Mr. E. M. Wedderburn undertook the investigation of this subject in the Scottish Lochs, a very detailed research being carried on upon Loch Earn. As a result some interesting new conclusions were arrived at, and the Scottish investigators have the satisfaction of knowing that their work has led to a greatly increased interest being taken in seiches throughout the civilised world.

The second important line of investigation which has been pursued in Scotland during the last twenty-two years is the *Botanical Survey* of the country, and this investigation also, sadly enough, had its inception marked by the loss of a young and promising life. Mr. Robert Smith, a student of University College, Dundee, by the advice of Prof. Geddes, went to continue his studies at Montpellier under Prof. Flahault, and was there initiated into the new methods of botanical survey. On his return he began to apply these methods to Scotland, and in 1900 published two sheets of his survey, the Edinburgh District and the North Perthshire District, with accompanying letterpress. These two sheets were to be but the first instalment of a very elaborate scheme, but, only a month or two after their publication, Mr. Smith succumbed suddenly to a severe attack of illness, leaving his work begun merely.

But it has not been allowed to remain untouched. The new methods aroused much enthusiasm in Great Britain generally, and a number of separate investigations have been carried on, a Committee having been appointed to ensure uniformity of method, and to avoid overlapping. In Scotland Mr. Robert Smith's work has been continued by his brother, Dr. W. G. Smith, who has published (1904-5) sheets for Forfar and Fife, with illustrative letterpress. Dr. Marcel Hardy, also associated with Dundee College, has published (1906) a very beautiful vegetation map of the whole of the northern part of Scotland, with an accompanying article. A number of less elaborate articles have also appeared; we may note as illustrating the way in which the work is being continued the article on the vegetation of a small region which appeared in the issue of the *Scottish Geographical Magazine* for September 1911, and the more elaborate study of a limited region which is to appear in the April issue of the present year (1913).

A third line of investigation which has been receiving a considerable amount of attention is that of *Regional Surveys*. A scheme for such surveys, based upon the 1-inch maps of the Ordnance Survey, was first suggested by Dr. H. R. Mill in 1896, and he subsequently prepared a specimen memoir based on sheets 317 and 332 of the Map of England. In connection with the application of the method to Scotland my own article on the Kingussie district (1906) may be mentioned. Surveys along similar lines are also being undertaken in connection with the work of the recently established lecturership in Geography in Edinburgh University. A number of the papers prepared by the students here have already appeared, and in the course of time the whole of Scotland will no doubt be studied in this detailed fashion. Further, the publication, at Cambridge, of a series of volumes dealing with the counties of the United Kingdom (*The Cambridge County Geographies*), should be noticed. The volumes on the Scottish counties have been contributed by Scottish geographers and others, and attest the increasing interest in Regional geography. Another indication of this is the attention which is being paid to the study of Ordnance Survey maps in schools.

In connection with the subject of Regional Survey we may note that in 1908 a Royal Commission was appointed to report upon the ancient and historical monuments and constructions of Scotland. Three sections

of this Report, dealing with Berwick and Sutherland and Caithness respectively, have now been prepared. Much archæological work has also been done, especially in connection with Roman antiquities, by Dr. David Christison, Mr. James and others.

To this account of progress which has been made in the investigation of detailed problems in Scotland, we must add a note in regard to the High-Level Meteorological Observatory on Ben Nevis, to which allusion was made in Mr. Silva White's Report. Here we have to record not progress but retrogression. In October 1904 the High Level Observatory, and also the Observatory at Fort William carried on in connection with it, were both closed for want of funds to continue their work.

The Observatory at the top of Ben Nevis was commenced in 1883 and completed in 1884, and in the autumn of 1890 a fully-equipped observatory, almost at sea-level, was opened in Fort William. For the summit of the mountain a complete set of hourly observations of the various meteorological elements is available for a period of fully twenty years, and for the last fourteen years of that period there are simultaneous hourly observations for Fort William. From 1884 to 1890 there is a useful Fort William record of observations made at fixed hours several times each day. The entire series of observations has been published in detail, along with numerous scientific papers, in vols. 36, 42, 43, and 46 of the *Transactions* of the Royal Society of Edinburgh, and these volumes form a splendid record of the enterprise of the Scottish Meteorological Society, which, with only the scantiest help from Government, raised the extensive funds necessary for such a great undertaking. Imperishably associated with the history of these Observatories are the names of Mr. R. T. Omond and the late Dr. Buchan. Great regret was expressed at the time of the closing of the Observatories, and it is hoped that they may be re-opened at some future date. Both were of great importance in connection with Scottish geography, not only from the information which the records supplied, but also from the way in which they afforded training to many young investigators, some of whom are now occupying important posts in different parts of the world, and have already done much useful work.

Dr. John Horne, F.R.S., has supplied the following account of the progress made by the Geological Survey :—

"The chief work done by the Geological Survey in Scotland since 1889 may be grouped under the following heads : (1) the Highlands and Western Isles ; (2) the Southern Uplands ; and (3) the Midland Valley.

"The mapping of the belt of complicated ground in the north-west Highlands, comprising the Lewisian Gneiss, the Torridon Sandstone, Cambrian strata and Eastern Schists, which was begun in 1883, was completed about 1896. Nearly all the maps embracing this area have been published, and the results of the work are embodied in an important memoir on *The Geological Structure of the North-West Highlands of Scotland*, published in 1907. Since the publication of this memoir the north-west of Scotland has become a classic region for the study of those great movements by which the crust of the earth has been affected in mountain building.

"East of the great post-Cambrian displacements large areas of the Eastern Schists in the counties of Sutherland, Ross and Inverness have been surveyed. The conclusion has been reached by some of the members of the staff that the Moine Series represents a succession of altered sediments which rest unconformably on inliers of Lewisian Gneiss. Of special interest is the evidence obtained in Ross-shire between Loch Luichart and the river Carron, which drains into the Kyle of Sutherland, proving the manufacture of crystalline schists and gneisses out of sediments and intrusive igneous rocks by movements after the consolidation of the igneous material.

"The greater portion of the area occupied by metamorphic rocks between the Great Glen and the Highland border has been surveyed. Various maps, with accompanying memoirs, comprising parts of this wide region, have been published since 1889, of which the following may be mentioned: Sheet 93, Ben Wyvis; Sheet 85, Lower Strathspey; Sheet 65, Braemar and Ballater; Sheet 55, the district of Blair Atholl and Pitlochry; Sheet 45, Oban and Dalmally; Sheet 36, Mid-Argyll; Sheet 37, Upper Loch Fyne; Sheet 28, Knapdale and Jura; Sheet 29, Cowal. The islands of Islay and Colonsay have been surveyed, and the maps 19, 27, and 35, with the memoirs, have been published. While much valuable information has been obtained regarding the metamorphic rocks of this region, it must be admitted that the order of succession of the strata has not been satisfactorily determined. Various theories have been advanced to explain the tectonics; the latest put forward by one of the officers of the staff postulates great recumbent folds and displacement of the rocks.

"Progress has been made with the mapping of the Jurassic sediments and the plutonic and volcanic rocks of the Western Isles. The central and south-eastern parts of Skye and the islands of Raasay, Scalpay, Rum, Canna, Eigg and Muck have been surveyed, and sheets 70, 71 and 60, with descriptive memoirs, have been published. Special reference ought to be made to the valuable memoir on *The Tertiary Igneous Rocks of Skye*, published in 1904, which deals specially with the petrology of the rocks of that region.

"The revision of the Southern Uplands in accordance with the sequence of the graptolites, as determined by Professor Lapworth, was begun in 1888 and completed about 1896. The results of this work are set forth in a large memoir on *The Silurian Rocks of Scotland*, published in 1899, which deals with the stratigraphy, the palæontology, and the petrography of the region. In the course of this revision an important zone of Radiolarian Cherts of Lower Llandeilo and Arenig age was detected, underlain by Arenig volcanic rocks, which appear along anticlines throughout the Uplands.

"Regarding the Midland Valley progress has been made with the revision of the coalfields. In 1900 a memoir on *The Geology of Central and Western Fife* was published, and in 1902 a volume appeared, descriptive of the geology of Eastern Fife—both by Sir Archibald Geikie.

"The detailed revision of the coalfields was begun in 1902, and since

that date the Carboniferous areas in the Lothians and large parts of the Lanarkshire and Stirlingshire fields have been re-examined. New editions of sheet 32 (Midlothian) and sheet 33 (East Lothian), with accompanying memoirs, were published in 1910. A special map of the Glasgow district with a descriptive memoir was also published in 1911. The characteristic feature of these memoirs is the large additions to our knowledge of the economics of these fields, and of the petrology of the igneous rocks associated with the Carboniferous strata. A special economic memoir on *The Oil Shales of the Lothians* was issued in 1906, for which there was a steady demand, and a second edition was published in 1912.

"Colour-printed geological maps on the scale of four miles to one inch are now being issued, chiefly for educational purposes. Four sheets have been published.

"In 1910 colour-printed geological maps on the scale of one inch to a mile were issued for the first time in the history of the survey in Scotland. These maps show both the solid geology and superficial deposits.

"Since 1889 a photographic department has been organised in connection with the Geological Survey. Nearly 3000 photographs have been taken, illustrating the geological features of different parts of Scotland. A brief descriptive catalogue of about 2000 of these photographs has been issued for the benefit of educational institutions.

"In the course of the detailed mapping of the geological structure of the country much valuable information has been acquired regarding the evolution of mountain forms and the various systems of drainage."

II. Oceanography.—The second subject with which Scottish geographers have been especially busied during the last twenty-two years is that of Oceanography. An interest in this subject is easily accounted for in a country which has so large a coastline, and which in certain regions depends more upon its fisheries than upon the products of the often barren land.

It will be recollected that the publication of the *Challenger Reports* took place from Edinburgh, and the Challenger Office, under the Directorship of Sir John Murray, was an active centre of scientific work in Scotland for more than twenty years. Sir John Murray took over the Directorship in 1882, on the death of Sir C. Wyville Thomson, and the concluding volumes of the Reports were not issued till 1895. Even after their completion the Challenger Office remained, and still remains a centre of active life: from it the Reports of the Loch Survey were issued in 1910.

The two concluding volumes of the *Challenger Reports*, entitled Summary and Results, include what is virtually a treatise on Oceanography by Sir John Murray. Since the date of their publication the author's continuous interest in the subject is attested not only by many separate papers and memoirs, but also by the fact that in 1911 he supplied the funds for the *Michael Sars* expedition to the North Atlantic, an expedition which has yielded results of high value for oceanographical science, and led to the publication of a very important book, *The Depths of the Ocean* (1912), by Sir John Murray and Dr. Johann Hjort.

Further, the North Sea Fisheries Investigation Committee, acting in co-operation with the International Council for the Exploration of the Sea, has for some time been carrying on detailed investigations both of practical and theoretical problems. Prof. Darcy W. Thompson, of Dundee College, together with his assistants, has already been able to draw from these investigations various conclusions of great interest in connection with hydrographical problems.

Under the heading of Oceanography also we should include much of the work done by Dr. W. S. Bruce, although Dr. Bruce has mostly carried on oceanographical research in high latitudes, so that his work falls under the heading of Polar Exploration—but the general subject is one which he has enriched by many pieces of research. Dr. Bruce has also founded, in Edinburgh, the Scottish Oceanographical Laboratory, where a considerable number of expeditions have been organised.

III. Polar Exploration.—The mention of expeditions leads us to the third subject in which great interest has been displayed in Scotland in recent years, this being Arctic and especially Antarctic exploration. In 1892-3 Dr. Bruce, in company with some other Edinburgh gentlemen, visited the Antarctic regions on board a Dundee whaling expedition. Some of the results of this expedition were laid before the British Association in the autumn of 1893, and before the Royal Scottish Geographical Society in the early part of the following year. To the British Association also Dr. Bruce expressed his strong desire to return to the Antarctic, a desire which was not fulfilled till some years later.

In 1898 the Royal Scottish Geographical Society issued a special Antarctic number of their *Magazine* with the special object of enlisting sympathy with work in this region, and of obtaining support for a British Antarctic Expedition. This number contained a stirring appeal from Sir John Murray, and also an article by the same author setting forth the advantages to science which might be expected to result from a well-equipped Antarctic expedition. There were also included in addition articles on the History of Antarctic Discovery, on the Flora and Fauna of the Antarctic, and an Antarctic Bibliography.

These efforts no doubt played their part in determining the British Government to give a grant in aid of the proposed British Expedition, but they did not exhaust Scottish interest in Antarctic exploration. In 1900, Dr. W. S. Bruce put forward his plans, the result of long consideration, for a Scottish National Expedition to the Weddell Sea. In the following year Dr. Bruce published a further article indicating the final form of his matured plans, and at the beginning of November 1902 the *Scotia* set out from Troon for the Far South with the members of the expedition on board.

Work was carried on in the south for two years, and not till July 1904 did the *Scotia* return to Scottish waters. During their first summer, in March 1903, the members of the expedition set up a Meteorological Station in the South Orkneys. This station was subsequently taken over by the Argentine Government, and is still in operation, so that it is satisfactory to think that one result of the Scottish Expedition has been the permanent establishment of a Meteorological Station in the Far South.

Mr. R. C. Mossman, the meteorologist of the expedition, remained behind in the South Orkneys for another year, in the service of the Argentine Government, and he has since become permanently attached to the Meteorological Office of that country, and has published a number of articles on meteorological subjects.

The *Results* of the *Scotia* expedition are still in course of publication, but we may note as especially important the rich zoological collections obtained, and the extensive soundings which were made in the South Atlantic Ocean and the Weddell Sea, which permitted Dr. Bruce to construct a bathymetrical map of this part of the ocean. It is interesting to note that Lieut. Filchner's recent explorations in the Antarctic have led to the discovery of a coastline which is undoubtedly a prolongation of Coats Land, discovered by Dr. Bruce. As already suggested, the meteorological observations made were also extremely valuable, and have thrown much light upon the atmospheric conditions in the Weddell Sea.

Dr. Bruce proposes to return to the Antarctic area with another expedition, but in the meantime he has taken a number of cruises to the north, notably to Prince Charles Foreland, Spitsbergen, of which he has made a special survey. Other members of his scientific staff also have carried on various Polar investigations. For example, Mr. R. C. Mossman made two visits to the Greenland Sea, which permitted him to publish a valuable paper on the Summer Climate of that Sea and the Ice Distribution there. We may perhaps also note that the *Scotia*, the ship in which Dr. Bruce made his cruise, has recently been chartered by the Government for ice observation in the Atlantic, with a view to preventing a repetition of the *Titanic* catastrophe.

IV. General Travel and Exploration.—As already noted, the day for sensational discoveries in this field, save in the case of Polar regions, is almost past, but during the last twenty years a number of Scotsmen have advanced geographical knowledge in various regions of the globe by their exploring work. Among others, we may mention, in addition to those already referred to, the names of Lieut. Boyd Alexander and his brother Lieut. Claude Alexander, whose African explorations, so sadly cut short, disclosed many facts of great interest; of the Hon. D. W. Carnegie, who during his short life undertook three expeditions into the desert interior of Western Australia; of Mr. G. F. Scott Elliot, who has done exploring work in the Ruwenzori region of Africa and in South America; of Dr. H. O. Forbes, who has carried on investigations in various parts of the world; of Prof. J. W. Gregory, now of Glasgow, who has done exploring work in Africa and Australia; of Col. J. R. L. Macdonald, who has added much to our knowledge of Uganda; of Prof. Sir W. H. Ramsay, whose researches in Asia Minor, though primarily archæological, touch geography on various sides.

V. Geographical Education.—In regard to this progress has been rapid during the last twenty-two years. To the Oxford School of Geography, established in 1899, Scotland has sent two successive Readers, Mr. Mackinder, and Dr. A. J. Herbertson, both of whom have promoted geographical education greatly both by teaching and by their text-books. The Universities of Scotland were later than those of England in estab-

lishing Departments of Geography, and not until 1908 were the efforts made by the Royal Scottish Geographical Society to establish geographical lecturerships in Scottish Universities crowned with success. In January of that year Mr. Geo. G. Chisholm, M.A., B.Sc., the author of the well-known *Handbook of Commercial Geography* and other books, was appointed Lecturer on Geography in the University of Edinburgh. In the following year, Captain H. G. Lyons, Director-General of the Survey Department of Egypt, was appointed Lecturer in the same subject in the University of Glasgow, and on his resignation in 1911, Dr. J. D. Falconer, late principal officer of the Mineral Survey of Northern Nigeria, took his place.

Considerable progress has also been made in regard to the teaching of geography in schools, which is now beginning to follow distinctively modern lines.

VI. The Work of the Royal Scottish Geographical Society.—In Mr. Silva White's *Report* allusion was made to the foundation of this Society, and to the work which it had done at the time of the publication of the article. Since this date the membership has been doubled, the Society has received an annual Government Grant of £200, and all its activities have greatly increased. On the 31st October last there were 1898 Ordinary Members, and 166 Teacher Associates. In connection with the Society an Association of Scottish Teachers of Geography has been formed, with the object of promoting the teaching of geography on modern lines.

VII. Geographical Publications.—The number of geographical text-books has increased so greatly since 1889 that it would be impossible to give a list of all those written by Scottish authors, or dealing with Scottish subjects, while it would be invidious to make a selection. But three atlases of outstanding importance must at least be mentioned. The first of these is the Royal Scottish Geographical Society's *Atlas of Scotland*, which was designed and prepared under the direction of Dr. J. G. Bartholomew, with the assistance of a number of specialists, and was published in 1895.

In 1899 there appeared as the first instalment of *The Royal Physical Atlas*, the *Atlas of Meteorology*, which was prepared by Drs. J. G. Bartholomew and A. J. Herbertson, under the general editorship of the late Dr. Buchan. In the beginning of the present year another instalment of the same atlas appeared in the shape of the *Atlas of Zoogeography*, prepared by Dr. Bartholomew and Messrs. Eagle Clarke and Grimshaw. All these are beautiful pieces of work, almost invaluable to the student.

In the above summary account attention has been limited to geographers who have had a definite association with Scotland. It would have been easy to extent the list of achievements considerably by including the names of those of Scottish birth or descent, whose work has not been carried on in close association with Scotland; but it has been thought better to leave these to be discussed among English explorers.

THE GEOGRAPHICAL FACTOR IN CIVILISATION.[1]

By Thos. W. M'Cance, M.A.

Geography and History Related.—There are probably few departments of knowledge in which greater progress has been made within recent years than in those of History and of Geography; in History, as showing the progress achieved by man; and in Geography as indicating in a general way the places most suited for man's habitation, those which assist or hinder his life, his movements, and his means of communication. A few years ago our knowledge of History was obtained chiefly from books with records of man's life, and from coins and inscriptions; but, nowadays, the student of History is forced to some extent to take account of climate, soil, and other geographical conditions, in order to understand thoroughly the life and progress of any people. Both History and Geography are now, as it were, Natural Sciences perfecting their methods of investigation.

Geographical conditions have remained in general fairly stationary for the last few thousand years; and yet, in that time, man has made enormous progress, especially in Western Europe. His progress, therefore, is not due chiefly to altered geographical conditions. A difference in conditions between one place and another helps to explain a difference in progress between one people and another: but it does not necessitate this difference. Let us compare Britain, Russia, and China in this respect.

Probably few factors have contributed more to human progress than the greatly extended use of coal in the nineteenth century. Coal has existed, where it now lies, for long ages in China, in Russia, and in Britain; but it became important in national development only when man had learned how to use it and how to obtain it easily. Russia has only recently begun to realise her great mineral wealth, while China has scarcely touched her coalfields, although she possesses the largest known coalfield in the world, in which some of the seams are forty feet thick. That is, between the fact of the existence of coal in our island and our industrial supremacy in the last century, there was no relation of cause and effect—only a geographical condition, without which it would have been almost impossible for our country to occupy its present position among the nations.

To take another example, Carlyle tells us in his essay on the state of German literature that, "The three great elements of modern civilisation were gunpowder, printing, and the Protestant religion." Now, before man could use gunpowder he must have known how to make it, and this knowledge was gained, probably, from the accidental discovery of the explosive nature of nitre (found so plentifully in the soil of China) when mixed with the charcoal of some wood fire. We know that saltpetre (or

[1] A paper read before the Geographical Section of the Royal Philosophical Society of Glasgow, March 6, 1913.

nitre) was early known as "Chinese snow," and gunpowder was used by the Chinese long before it was used in Britain. The knowledge of the process of manufacturing gunpowder travelled west, and was brought by the Arabs into Spain; the explosive was used by the Saracens in their wars in Eastern Europe and by the Moors in Western Europe. This knowledge of gunpowder, so easily and so early gained in China, has not given China a great place among the nations, any more than the possession of coalfields; because the Chinese did not know of the existence of the one or how to develop fully their knowledge of the other. That is, geography supplies conditions, not causes of progress: in other words, the geographical factor is mainly passive.

The importance of favourable conditions varies directly, of unfavourable conditions inversely, with the character and the stage of civilisation of the people who may act upon them.

Difficulty in knowing early Conditions.—But before one can understand the connection between Civilisation and Geography one must try to reconstruct the earth as it appeared in ages long past. One is forced to do so in order to know what influences worked on early man, and here one is confronted by an almost insuperable difficulty. At present we know practically nothing of these early conditions; and yet, it is all the more important to know these conditions, because primitive man was so comparatively powerless to overcome adverse surroundings. It was only after long ages of struggle against nature that he learned how to choose the places with the most favourable conditions, and how to overcome some of the more unfavourable conditions in other places. An important point in connection with our difficulty in understanding the physical conditions which acted on primitive man, is the relation of our earth to the sun and to other heavenly bodies. At the present moment astronomers are baffled by the behaviour of certain satellites of other planets and by the movements of certain stars, which, it seems, cannot in every case be reasonably attributed to gravitation. In the same way we cannot be certain that we know all the forces which have ever acted on our earth, or that the forces at present acting have always acted with the same relative degree, nor can we know all the changes through which our earth has passed. The seasons may have been, and probably were, different from what we now experience. If, as was probably at one time the case, in December the axis of our earth in northern latitudes was inclined *towards*, instead of *away from*, the sun, as at present, there would be a great difference in climate: and climate is a determining factor in the existence of most plants and of most animals, and is therefore for that reason alone, if for no other, supremely important to man. We know that the Arctic Regions must have had at some one or more times a much more temperate climate than they now possess.

Again, in past times, there have been enormous changes in configuration. Geology proves that continents now submerged once made complete land communication possible from South Eastern Asia to New Guinea and Australia, and thence by way of Antarctica to South America; and from India by way of Madagascar to Africa. We have

not less strong proof that Africa was at one time united to Europe where the Strait of Gibraltar now separates these continents. The remains of a hearth with bones of the hippopotamus have been found in Malta, and also bones of pygmy elephants. Connect the existence of these animals with the great valleys in Malta formed by erosion, and it is almost certain that the island at one time formed part of the African continent, if it was not indeed a link completing a land ridge between Africa and the mainland of Europe.

The Sahara was not always so broad as it is now, nor was the South-Eastern Mediterranean region so barren as at present. The Western Hemisphere was connected with Europe by Greenland, Iceland, the Faroes and Britain on the east; and by Behring Strait to Asia on its west, if not at other places as well. Geology informs us that the peopling of our earth took place in inter-glacial, if not in pre-glacial ages, when the climate was much milder in our Northern Hemisphere, before the Bosporus was formed and before the great sea now represented by the Caspian Sea, the Sea of Aral, and Lake Balkash had shrunk to its present condition.

Ethnologists believe that all men are descended from the same common stock. Thus, an anatomist may fairly easily distinguish the bones of the arm of a man from those of the fore limb of a gorilla; but it would puzzle him to tell whether those same bones had belonged to a Chinaman, a Bushman or an Englishman. We do not know where the parent tribe lived nor when it appeared. Probably the excavations at present being carried on at Troy, in Palestine, in Egypt, in Crete, in Italy and in other places may throw some light on these questions.

In this paper I do not intend to discuss the question of civilised man's former state as a savage. There is too much uncertainty and supposition here also. All peoples do not pass through Morgan's successive stages. We have almost no knowledge of when our primitive ancestors learned how to create fire, to make the bow and arrow, or to fashion a clay pot. We do not even know when they first domesticated the dog and other animals. The bones of the dog are found amongst very early remains of man.

In order to see some of the relations between Civilisation and Natural Conditions I purpose dealing chiefly with the early Mediterranean region as best showing the continuous progress of man; and, then, since the development of minerals is also the history of man's progress, and the use of a few minerals as weapons or as tools was probably the determining factor which gave one people the distinct advantage over another, I shall consider briefly the search for minerals and more particularly the use of copper and of clay: with the consequent progress made by peoples brought into contact with each other in this region.

The Mediterranean most suitable for Progress.—Civilisation, as we know it, was nourished for thousands of years in the Mediterranean countries, the "Orbis terrarum" of the Romans, because this region is a huge junction zone, more favourable to continuous progress than any other part of the earth. Consider the shape of the sea, its length, very great

compared with its breadth: its peninsulas and its islands, all tending to facilitate crossing at a time when man had no mariner's compass. Consider the varieties of soil in the surrounding countries, the grass lands and wheat lands, the sloping mountains, giving as many varieties of climate and of vegetation as may be found between the Sahara and the Arctic Circle, and one must say that, until man had learned boldly to face the stormier ocean, it was the best nursing ground for early progressive human life: and this because the Great Sea afforded such easy communication between different peoples striving to "live well" under different natural and social conditions.

Let us now see some of the efforts of these early Mediterranean peoples to "live well." To "live well" is a comparative term, and with different peoples inhabiting a great region stretching from Spain to the Persian Gulf, and being more and more gradually brought into contact with each other, the standard of living was likely to rise as better methods and better tools were used and attainable luxuries became more common.

Neolithic Trade.—Professor Angelo Mosso in his *Dawn of Mediterranean Civilisation*, says that in Neolithic times (which he places from about 7000 B.C. till 4500 B.C. for Southern Europe) man was sailing on the Mediterranean, in a cabined boat propelled by wind and oars, which argues a certain proficiency in navigation: and with one of the obsidian knives used by Neolithic man more than six thousand years ago, the author was able to sharpen his own pencil while taking notes of excavations in Crete. Obsidian is a kind of volcanic glass originally found abundantly on the island of Melos in the Cyclades. In the Neolithic age this glass was sent all over the borders of the Aegean and found its way into Troy, and even into Egypt, where it was commonly used for razors. Again it is known there was considerable traffic in the Eastern Mediterranean in henna, Gr. *κύπρος*, a plant used in perfumery, toilet purposes, and in some of the religious services. The fact that the Greek name for this plant is the same as that for the island of Cyprus, points to Cyprus having been a chief source of supply of this plant in Neolithic times.

Silver, to which I now refer, reveals still further the extent of Mediterranean commerce. This metal has been found in the most ancient tombs in Crete; and also along with copper at the close of the Neolithic period in Egypt. Where did it come from? probably from Spain or from Sardinia, in both of which places it is found pure. It might have come from Attica, in Greece, where silver is still worked: but in Attica it has to be extracted from lead ore, and though the Greeks, of say 500 B.C., seem to have understood partly the process of extraction, it is improbable that Neolithic man had any knowledge of the art. We thus see that in the search for obsidian, henna, and silver the Neolithic navigators of the Mediterranean had penetrated east and west, and also north and south.

With regard to copper, we know it was imported into Egypt from Crete in very early times. Chrysocamina (oven of gold), near Gournia, in Crete, bears evidence of the very early use of copper in that island.

Here has been found a prehistoric copper mine. The early inhabitants of Crete seem to have been the first in the Mediterranean to work in copper. Professor Mosso says: "The bronze age in Crete shows such perfect work in the art of casting, that nothing can be found equal to it in artistic worth, even in the north of Europe. The Phœnicians, who came after the Minoan civilisation, and were believed to be the artists who diffused the art of casting in bronze, remained inferior to their Cretan masters in the technique of metal work and in the plastic of bronze."[1]

No copper ores or veins have been found in Crete nor yet in Cyprus, so that it is probable that in both these islands, the trade in copper, and later, with extended navigation, in bronze, arose from copper being found on the surface of the earth. This substance mixed with carbonate was collected and was the origin of Cretan and Cyprian trade in copper weapons and tools. Copper and bronze relics of Minoan stamp have been found in Sardinia, in Italy, and in Egypt.

Let us now look shortly at iron. Iron relics of this very early period are rare. Mr. Chisholm tells us in his *Handbook of Commercial Geography* that the most ancient relic of an iron implement brought to light is a piece discovered in one side of the great Pyramid of Gizeh. That carries us back five thousand years. He then explains the rarity of remains of ancient iron implements as compared with those of bronze, by the fact that, "Under the influence of air and moisture iron is eaten away so rapidly that its preservation for a long period is possible only under very exceptional conditions. So liable is it to disappear that, of all the numerous articles of iron that must have existed in ancient Egypt, the remnants which have been discovered do not weigh in all more than half a pound, and this in a country with a dry climate specially suited for the preservation of such articles." At Knossos, in Crete, in Neolithic strata a small piece of magnetic iron has been found, weighing half a kilogramme. It seems to have been a sort of charm or to have been connected with worship, and was evidently never used as a hammer.

Mount Sinai is rich in copper and iron, but the ores are too deep seated to have been worked by early man. The Homeric poems represent Greece as beginning an iron age about 1200 B.C., and we know the Greeks obtained their supplies of iron from Chalybes to the west of Trebizond on the Black Sea. Iron was not worked in Elba till after the arrival of the Etruscans in Italy about 1100 B.C. Strabo, the geographer and historian, speaks of iron being produced in very early times in Calabria, though no longer worked in his day, *i.e.* about the time of Christ. The Romans knew of the rich ores of Bilbao, in Spain, but their methods of working were very defective and very expensive.

The iron industry, costly as it was, gave the Romans weapons and tools superior to those of most of their contemporaries, and, in conjunction with the situation of Rome at the geographical centre of the

[1] Professor Mosso's views on the Cretan origin of our culture seem to be shared by Professor Myres of Oxford. In the *Dawn of History* we find: "It is here (in Crete) that man *first* achieved an artistic style which was naturalist and idealist in one; . . . wonderfully skilled in the art of the potter, painter, gem-engraver, and goldsmith."

Mediterranean, assisted in no small measure the spread of Roman civilisation. We thus see that, though iron is not scarce in the Mediterranean region, man was long in learning how to obtain it; but we know that once he had learned its importance, the knowledge would easily be spread and no efforts spared to obtain the valuable mineral.

Early Pottery.—Now with regard to clay, we find that the early Cretans were also clever workers in pottery, and the manufacture of earthenware reached a very high level in Crete in Neolithic times. There would seem to have been factories at that time, and potters placed their own private marks on the pottery they had made. Some fine examples of this predynastic pottery, showing the potters' private marks, may be inspected in the Royal Scottish Museum, Edinburgh. Pots with Minoan marks have been found in Hungary, in Egypt, and elsewhere, indicating the extent of Cretan trade.

In the *Dawn of History* Professor Myres says there is no evidence that the potter's art arose in the Nile Valley, adding that the raw Nile mud has not the qualities of a good pot clay.

"The new art appears rather suddenly in one well-defined district of Upper Egypt at a high level of technical skill." It is a good thing for the historian that clay was plentiful in the places most suitable for early man, that is the clayey wheat producing soils of Egypt and of Mesopotamia. When the potter out of soft shapeless clay makes a definite shape, we have the creative art. The clay pot once formed was exposed to fire or dried in the sun, and thus made brittle. Hence it had a brief existence, so brief, that pottery, the manufacture of common household pots, was as regular, though not, of course, so frequent an occupation with the Neolithic housewife as baking. Pottery is more important to us, from the historical point of view, than Cretan or Egyptian or Babylonian weaving; because cloth is easily consumed, but the broken pot cast among the refuse remains, and reveals to later ages the life of the potter and the history of his times; and, as Professor Stewart Macalister says, "Pottery is the key to chronology."

Maritime Origin of Writing.—But clay is not only useful for pots in daily use, and for ornamental pots developing still further the creative and imaginative arts: clay soon became useful as a means of recording and transmitting signs. These signs or seals seem to have been first used on goods being shipped. A piece of soft clay was clapped on some particular part of a package and stamped with the seal or distinguishing mark of the vessel conveying it, as well as with the seal of the sender. The earliest Cretan seals are rude representations of ships. These seals soon changed into particular signs, and probably lost their original significance. Additional signs were used, and were also applied to other purposes, and with a sea-going people such as the Cretans, capable of artistic expression, and feeling the necessity of transmitting messages, with abundance of clay easily sun-dried in which to fix or record these messages, we can readily understand how the rudiments of writing once used were soon disseminated all over the Eastern Mediterranean region.

Of course it may be objected that the necessities of trade alone

would have produced the art of writing: but in no other place were so many favourable conditions conjoined in early times to produce this art as in Crete. Wallace found rudiments of picture writing in the Amazon valley: but the conditions there were unfavourable to further development. The art of writing arose in China under less favourable conditions, and probably at a later period. At any rate our script was little influenced by Eastern Asiatic man. The origin of writing, as we know it, was probably in maritime trade and, so far as we can learn, took place in Crete, whence it spread to Egypt and all round the Eastern Mediterranean.

The necessity of organised labour to fight the rising Nile, and to irrigate the fertile Nile valley, the expeditions against covetous marauding tribes, the highly centralised despotic government with messages and commands to be conveyed to great distances, led to many changes in devices stamped on clay, or recorded in other ways, which gradually developed into Egyptian hieroglyphics.

Again we learn that the ancient name of Gaza in Palestine was Minoa, from Minos, king of Crete. David, king of Israel, had a bodyguard composed of Cretans and Philistines, showing a close connection between Crete and Philistia in his time. The Bible speaks of the skill of the Philistines in archery, and the Cretans were famous among the Greeks as archers. In the time of the Ptolemies, say 250 B.C., the Egyptians believed that the Phœnicians were Cretans. Phœnician *φοινικός*, red man; connect this derivation with the fact that the Cretans painted in red: and, considering all these points, one is forced to conclude that both the Phœnicians and, later on, the Philistines came from Crete. Hence the Phœnician phonic alphabet also took its origin in Crete.

This art of writing was carried east by traders, and also gave rise to the Babylonian syllabic alphabet. Traces of hieroglyphic characters, older than the wedge-shaped or cuneiform, will be found in the inscription on the statue of Gudea, No. 74, Royal Scottish Museum, Edinburgh. Again it may be objected that these three forms of script, Egyptian, Phœnician and Babylonian, are different: but Dr. Tylor remarks in the *Early History of Mankind* that "One people got the art of writing from another, though not the same characters for particular letters." Cadmus is said to have introduced into Greece, from Phœnicia or from Egypt, the Greek alphabet of sixteen letters, and the Phœnician script was adopted by the Semites. Thus there is a strong probability that all the various scripts of the Eastern Mediterranean region, and therefore, of our own Northern European languages, which are all derived from them, were Cretan in origin, though differing in particular letters: and the ancient script of Crete, not yet fully deciphered, began in maritime trade. That is, the art of writing, man's most potent means of furthering progress, was called into existence by the fortunate combination of geographical conditions which determined the occupations of the earliest navigators of the Mediterranean, and was by them spread throughout the whole region.

Colonisation in the Mediterranean.—Let us now look shortly at the

progress of a few of the peoples on this Mediterranean Sea. As indicated above, in connection with the art of writing, the Cretans formed settlements on the mainland to the east of the Mediterranean, probably driven by trouble in their own densely populated home, "The Island of a hundred cities," according to Homer; probably also, attracted by the central position of Palestine among the then civilised countries.

They established themselves about 2700 B.C. in Phœnicia to the north, and much later, about 1500 B.C., in Philistia to the south. We might ask, What took the Cretans to Philistia? As compared with Egypt and some other regions round the Mediterranean, this country is now comparatively barren, though considered a land "flowing with milk and honey" by the Israelites who took possession of a part of the same land about a century later. Dean Stanley in *Sinai and Palestine* states that the flora of the district has been much changed within the last three thousand years. Probably the climate has become drier; but, in any case, unfavourable though the soil may be in the eyes of an Egyptian, to the Israelite coming from the desert country east of Jordan it appeared all that was good. The Cretans were traders and probably wished to capture some of the through trade between the surrounding civilised peoples, as their kinsmen, the Phœnicians, had done so successfully further to the north.

If the Philistine Cretans were not successful, we know that the Phœnician Cretans were eminently so: for Tyre existed as a trading centre of great importance for more than three thousand years, until it finally decayed under the combined influences of Turkish misrule and altered natural conditions. Different conquerors overran it in turn: but though man might destroy the commercial prosperity of Tyre and Sidon for a short time, while the geographical conditions which produced these cities remained unchanged, the fortunes of Phœnicia were assured.

The Phœnicians were traders, and in pushing their business everywhere, both by land and by sea, they distributed to the world the wares of Egypt, of Babylon and of other places. To the great powers around, Phœnician ships and Phœnician sailors were indispensable. Sennacherib, Xerxes, and Alexander the Great, each in turn employed them for their transports, and even for naval warfare. One might say the Battle of Salamis, 480 B.C., possibly the most decisive in the history of European civilisation, was not so much a struggle between Greek and Persian, for the Persians were not sailors, as rather a naval contest between the sea-powers of Greece and of Phœnicia. To facilitate trade the Phœnicians had established trading stations or factories along various sea routes. One of these, Kart Hadjat (the New City), better known as Carthage, in later times the great rival of Rome, was founded in 813 B.C. by a fugitive princess from Tyre: another further west was Cadiz, the Tarshish of the Bible, which had long been used by Phœnicians and Carthaginians as a trading centre for tin, silver and amber.

This station or outpost was in 501 B.C. definitely occupied by the Carthaginians, who were attracted by its large natural harbour, its profitable fisheries, and its rich metalliferous hinterland: and probably,

in order better to compete, by the Atlantic route, with Cumæ, north-west of Naples, founded about 1000 B.C. by Greek Chalcidians from Chalcis (from which χαλκός, which was the Greek word for copper) to the west of Negropont, where copper was now exhausted. Tin was much in demand for the manufacture of bronze for weapons, tools or ornaments: and the chief source of supply was Cornwall and the Scilly Isles, the Cassiterides (tin islands). The Phœnicians held the sea route, the easier route: and the Greeks wanted to hold the overland route, *via* the Loire and the Rhone. About 560 B.C. another Greek colony was founded by Phocæans from north-west of Smyrna in Asia Minor, copper and tin workers driven out of Phocæa by Persian pressure. This colony was Marseilles, nearer the overland tin route than Cumæ: and soon there was war between Marseilles and Cumæ, the result of commercial rivalry. Indeed rivalry in trade was both a blessing and a curse to Greece. It has little hinterland, and the various town states were separated by mountain chains, so that communication was easier by water.

As happened often in the history of Phœnicia, the Greek towns fought against each other or against their own colonies, so that the physical conditions which assisted in developing Greek civilisation also tended to destroy these states as political powers. Poverty produced emigration, which was further increased by their skill on the sea; hence the enterprising successful Greek colonies. But sailors, having to share the same dangers, are intolerant of tyranny; and the spirit of independence thus engendered, further stimulated by their success as colonists, produced commercial rivalry among the Greeks.

After the rise of Rome, Greece conquered her conqueror in another way, for Constantinople remained essentially Greek in culture for over a thousand years; and, on the occupation of that city by the victorious Turks, Greek culture was disseminated over the whole of Western Europe.

Thus the search for minerals was a determining factor in the development of Mediterranean civilisation, just as in our own day the search for minerals has developed Australia, Eastern Alaska, California, Chili and the Transvaal. Indeed, we may say that mineral wealth and superiority in mining methods account in no small measure for the present position of Britain and of Germany among the nations. Man can increase his agricultural riches even in unfavourable regions; but the supply of minerals is limited. He cannot manufacture coal or zinc.

With the extended use of the mariner's compass and the discovery of other commercial routes, the Mediterranean fell behind the more northern regions facing the Atlantic; and even the Suez Canal and the tunnels through the Alps, though assisting the region to a certain extent, have not restored to it anything like its former comparative importance, chiefly because of the almost entire absence of fuel, though electricity generated by cheap water-power may do something for the junction zones at the foot of the snow-capped mountains. Here again the conditions which were favourable to progress in early ages are comparatively unfavourable at the present time.

Geographical Hindrances to Progress.—As intercourse and easy routes of communication are of vast importance in the progress of any people,

so isolation tends to prevent development. We see this in the condition of the native inhabitants of Australia at the beginning of last century; in the present condition of Spain, where the parallel ranges of high mountains have formed so many isolated valleys; and in the condition of many tribes in the great equatorial forests of Central Africa and of the Amazon. China from her natural and artificial barriers has not made progress commensurate with her advantages in soil and climate; but we know not what the future will do for her. Signs of her awakening are becoming apparent. Within a few years Pekin will be connected by rail with Canton *viâ* Hankow, and another line of rail is already projected between Hankow and Rangoon *viâ* Chungking and Yunnan. The vast infant Republic is at last adopting Western civilisation.

Dr. Gregory has urged that white man may live in the tropics. Poisonous insects and malaria can be overcome, swampy regions can be reclaimed and barren lands rendered comparatively fertile. Yet with advancing civilisation man's dependence on geographical conditions is not destroyed, it is merely modified. He cannot entirely overcome difficulties in climate, in soil, or in environment; his life is so much bound up with that of animals and of plants. The effect of environment on animals is seen in the case of horses taken to the Falkland Islands; which, according to Darwin, have during successive generations become smaller and weaker, as in the case of the pygmy elephants of Malta; while horses running wild on the Pampas have acquired larger and coarser heads. The effect of natural surroundings is seen on plants, in the case of Sea Island cotton which degenerates in India, whilst Indian cotton improves in the South Eastern States round Florida. The English miller cannot produce Hungarian flour, even from Hungarian wheat, and the spinners of Pilsen and of Brünn need to charge their mills with artificial vapour to compete successfully in the production of the same kind of fabrics produced in the moist atmosphere of Britain.

That physical conditions affect national temperament, national morality, and national character is undoubted; though the influences are subtle, they are real, but are very difficult to determine, because different peoples are affected by the same kind of surroundings in different manners.

Britain, France, Italy, Germany and the United States of America differ in language, or in history, or in government, or in geographical conditions; yet their civilisations are practically the same. Freedom in communication has almost levelled down differences in progress arising from different conditions or from peculiar ethnical qualities.

Importance of Geographical Conditions.—Other factors in civilisation are as important as the geographical. But, nevertheless, geographical conditions, though rarely active, are enormously important in the progress of man. He is affected by these conditions at every point: in bodily frame, in physical health, in character and in material prosperity; and, though man may overcome many adverse conditions he can never rise very far above them. Rather, his success as a rule is possible only in modifying their effects and in working out his advancement along the lines permitted by his geographical surroundings.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

At a meeting of Council held in the Society's Rooms on July 28, it was resolved that the Livingstone Medal for the coming session be presented to Commander Evans, of the British Antarctic Expedition, and the Society's Gold Medal to Professor Albrecht Penck for his signal services to geographical science.

OBITUARY

DR. JOHN WATSON M'CRINDLE.

Dr. John Watson M'Crindle, an original member of the Royal Scottish Geographical Society, died at Westcliff-on-Sea on July 16, in his 89th year. Dr. M'Crindle was born at Maybole and educated there and at the Edinburgh University, where he graduated with distinction in 1854. For some years he taught classics in Edinburgh, but in 1859 he went to Calcutta as Principal of the Duff College in succession to Dr. George Smith. Seven years later he entered the Bengal Education Department, and after serving as a professor in Krishnagar College he became first Principal of the Government College at Patna; there he remained until 1880, when he retired. During his stay in Patna, M'Crindle, along with his wife, founded the first high-school for native girls. While in India he contributed a series of learned articles to the *Indian Antiquary*, chiefly annotated translations of classical works relating to ancient India. These were subsequently amplified and collected into book form, and have become widely known as a nearly complete collection and translation of everything relating to India to be found in Greek or Roman literature. He also edited for the Hakluyt Society *The Christian Topography* of Cosmas Indicopleustes, an Egyptian monk, which appeared in 1891. Shortly after M'Crindle left India he settled in Edinburgh, where he joined the Hellenic Club in the days of its glory—the days of Blackie and Butcher, of Hutchison Stirling and Walter Smith. In India, M'Crindle was honoured with the fellowship of the University of Calcutta, and at home, in 1898, with the honorary LL.D. of the University of Edinburgh. When the Scottish Geographical Society was founded in 1884 he took enthusiastic interest in its work, and in the following year he was elected to the Council of which he remained a member for sixteen years. It was not in the Council, however, that his influence on the Society's fortunes in its early days was felt so much as in the Geographical Club, a little band of those who first projected the Society, and who periodically came together in quiet convivial meeting to discuss geographical affairs, to plan out articles for the Magazine, and frequently to entertain distinguished explorers with simple tavern refreshment. At these unostentatious reunions there was much inspiring intercourse, and many an anecdote of thrilling adventure which had not been told in public lecture was

recounted by travellers from Central Africa or Asia or Arctic regions or islands of the Pacific. By the few who survive, M'Crindle's happy personality at these meetings will ever be remembered: his genial countenance would beam unalloyed friendliness and diffuse a feeling of contented satisfaction among all who were present. His knowledge, his experience, his scholarship were a source of strength, and on occasions his perhaps somewhat lingering wit would flash out in unexpected sallies, which delighted his associates. He was of great assistance to the editors in the early days, and contributed much to the pages of the Society's Magazine.

Dr. M'Crindle retired from the Society's Council in 1902, when the advancing infirmities of age forced him to give up active work. A distressing disorder of the eyes rendered him nearly blind, and he left Scotland to be with relatives in the south of England. There he died, deeply regretted by many old friends. W. B. B.

GEOGRAPHICAL NOTES.

Europe.

The Population of Scotland.—At the beginning of August, vol. xi. of the twelfth Census of Scotland was issued as a blue-book, and we note the following interesting points in regard to its contents:—The population of the country is given at 4,760,904 (2,308,839 males and 2,452,065 females). Compared with the census of 1901 there was an increase of 288,801, or 6·5 per cent. The present population is fully one million greater than the population of 1881, fully two millions more than that of 1841, nearly three millions more than that of 1811, and is 3,152,184 more than that of 1801. The ratio of females to males in Scotland at the present census was 106·2 to 100. At the last census this ratio was 105·7 to 100.

The 33 counties in Scotland vary in amount of population from 1,447,034 in Lanark, 507,666 in Edinburgh, 314,552 in Renfrew, and 312,177 in Aberdeen, to 7,527 in Kinross, 9,319 in Nairn, 15,258 in Peebles, and 18,186 in Bute.

Housing conditions are dealt with at some length, and it is shown that of the population of Scotland 2,077,277, or 43·6 per cent., are living more than two in a room; 1,005,991, or 21·2 per cent., more than three in a room; and 397,262, or 8·3 per cent., more than four in a room. Comparison with the figures of the earlier censuses shows that the proportion of the population living in the less crowded conditions has increased, and the proportion of those living in the more crowded conditions has decreased.

The enumeration of Gaelic-speaking persons in Scotland was first instituted in the census of 1881. The census now under review gives the number of Gaelic speakers at 202,398, as against 230,806 in 1901. Speakers of Gaelic and English in the year 1901 numbered 202,700, and of Gaelic only 28,107, the former being 7,977, or 3·8 per cent.,

fewer, and the latter 15,632, or 35·7 per cent., fewer than in 1891. By this census speakers of Gaelic and English are found to number 183,998, and to be 18,702, or 9·2 per cent., fewer than in 1901, and 26,679, or 12·7 per cent., fewer than in 1891 ; and speakers of Gaelic only are found to number 18,400, and to be 9,706, or 34·5 per cent., fewer than in 1901, and 25,338, or 57·9 per cent., fewer than in 1891.

Fishery Research in the North Sea.—The research vessel S.Y. *Hiawatha*, chartered for fishery research in the North Sea, left the Tyne on August 4 for the purpose of making certain practically continuous hydrographic observations, at a fixed position, during the first fortnight of August. She was to take part in a co-ordinated research into the movements of the great water masses in the North Sea, and for this purpose was to drop her anchor about 150 miles "E. by N. ½ N." of Shields. Her labours were to be identical in aim with researches simultaneously carried out on board eight other vessels, also at anchor. Two of these other vessels were to be research vessels, acting on behalf of Sweden and Scotland, the Swedish vessel working in the Skagerak, the Scottish well to the north-east of Aberdeen. The remaining vessels are light vessels, two acting for Holland and the other four for the English department.

The observations were to consist of current measurements made near both surface and bottom every hour night and day throughout the fortnight, and in fine weather at other intermediate depths. Special attention was to be paid to the submarine waves which, it is expected, are to be met with at the depth at which the heavier bottom water and the lighter surface water are in contact. Specially devised current meters are used in this work. The temperature and salinity of the various layers of the sea were also to be ascertained, special water-bottles being employed to secure samples of the sea from any desired depth. Samples of the minute floating organisms which, directly or indirectly, constitute the food of all our food fishes were also to be taken at various depths and at the extremes of the tide. It is expected that some 8000 independent current measurements would be made from the English vessels alone.

The operations have been planned by a special committee of the International Council for the Exploration of the Sea, it is stated, because a knowledge of the constitution and movements of the sea water is essential to the understanding of the movements and of the abundance of the fishes upon which the fishing industry depends. For instance, the abundance or scarcity of the herring of the Kattegat and Skagerak has been found to be connected directly with the amount of water which enters the Baltic from the North Sea, and other fisheries of Southern Sweden have been shown to change with the ebb and flow of this layer of cold, salt water.

The Scottish Zoological Park.—As a matter of local interest we may note here the opening of the Zoological Park, Corstorphine, Edinburgh, during the present summer. The Zoological Society of Scotland are to be congratulated both on the choice of so excellent a site for a

zoological garden, and on the progress which has been already made. As already stated here it is proposed, so far as possible, to keep the animals in open dens, on the Hagenbeck system, and those who have watched, *e.g.* the bears living in their open, water-surrounded enclosure, will have no doubt of the educational value of the system. The difference in the behaviour of the animals after they had been turned out of their confined temporary cages into the open was very marked, and it is now possible to make observations of great interest on the differences between the brown and polar bear, in relation to the natural surroundings of both animals. The park has been opened to the public, although the process of laying-out is just begun, and thus the gradual development of a modern type of zoological garden can be watched in detail day by day.

Africa.

Insect-borne Diseases in Africa. We have discussed here from time to time the various investigations and observations which have been made in Africa on the deadly diseases caused in man and domestic animals by the minute organisms known as trypanosomes, which are transmitted by tsetse flies. We have also spoken of the proposals made in various quarters that the larger game animals of Africa should be slaughtered on the ground that they serve as reservoirs of the parasites. In this connection it is interesting to note that the Secretary of State for the Colonies has nominated a Committee to report:—

1. Upon the present knowledge available on the question of the parts played by wild animals and tsetse flies in Africa in the maintenance and spread of trypanosome infections of man and stock. 2. Whether it is necessary and feasible to carry out an experiment of game destruction in a localised area in order to gain further knowledge on these questions, and, if so, to decide the locality, probable cost, and other details of such an experiment, and to provide a scheme for its conduct. 3. Whether it is advisable to attempt the extermination of wild animals, either generally or locally, with a view of checking the trypanosome diseases of man and stock. 4. Whether any other measures should be taken in order to obtain means of controlling these diseases.

The Committee is a large and representative one, and the inclusion upon it of some zoologists, notably of Dr. Chalmers Mitchell, will reassure those who fear that hasty and irrevocable steps may be taken with regard to those beautiful mammals which are already disappearing too fast from the surface of Africa.

Polar.

Arctic Expeditions.—It is announced that Captain Koch (cf. this Magazine, vol. xxvii. p. 656) has successfully accomplished his journey across the inland ice of Greenland, for he arrived at Proeven, near Upernivik, on the west coast, in the middle of July, after having left the

east coast on April 20 of the present year. Horses were used for traction purposes across the ice, but had finally to be killed for lack of fodder.

We learn further from the *Times* that M. Jules de Payer left Havre on August 10 on an expedition to Franz Josef Land, the little known north-eastern corner of which will be explored.

The American Crocker Land Expedition.—This expedition (cf. p. 326) left New York in the beginning of July, on board the steam sealer *Diana*, and, after putting in at Boston, reached Sydney, N.S., on July 9. Here some additional equipment was taken on board, and the boat left on July 13 for Battle Harbour, Labrador. From Labrador the vessel was to make for the west coast of Greenland, the objective being Cape York, where walrus and seal hunting were to be carried on. Much of the cargo may be landed at Payer Harbour, Pim Island, but the main headquarters of the expedition are to be at Flagler Bay, on the south side of Bache Peninsula.

The objects of the expedition, as finally arranged, are detailed fully in *Science* as follows:—"(1.) To reach, map the coastline, and explore Crocker Land, the mountainous tops of which were seen across the Polar Sea by Rear-Admiral Peary in 1906. (2.) To search for other lands in the unexplored region west and south-west of Axel Heiberg Land, and north of the Parry Islands. (3.) To penetrate into the interior of Greenland at its widest part, between the 77th and 79th parallels of north latitude, studying meteorological and glaciological conditions on the summit of the great ice cap. (4.) To study the geology, geography, glaciology, meteorology, terrestrial magnetism, electrical phenomena, seismology, zoology (both vertebrate and invertebrate), botany, oceanography, ethnology, and archæology throughout the extensive region which is to be traversed—all of it lying above the 77th parallel."

Though the original intention was to spend three summers and two winters in the north, sufficient supplies have been taken to permit of a longer stay should this seem desirable. The expedition is supplied with a powerful wireless telegraphy apparatus, and it is hoped to keep the base station in communication with the wireless stations of Canada, and so with Washington.

General.

The Scott Fund.—It is announced that £75,000 has been raised for the purposes of the fund. In the allocation of the money ample provision has been made for the publication of the results, which are to appear under the editorship of Captain Lyons, F.R.S. A total sum of £17,500 has been set apart for this purpose, which includes, besides the cost of publication, an allowance for the services of three biologists, three geologists, two physicists, and other specialists, in addition to a draughtsman, while a sum of £800 has been earmarked for maps and charts. Further, a sum of £10,000 is to be set aside to form a trust fund for

the endowment of Polar research in the future. It is also proposed that a group of statuary should be erected in Hyde Park facing the Royal Geographical Society's house, and there is also to be a tablet in St. Paul's Cathedral. Provision for the relatives of the dead explorers has also been made.

Communications in Mountain Regions.—It is a commonplace of geography that mountains offer obstacles to intercommunication. Hence it is natural to conclude that roads and other means of communication are less abundant in such regions than elsewhere. In a short note in a recent issue of the *Annales de Géographie*, however, M. Charles Biermann of Lausanne points out that, for parts of Western Europe at least, such a generalisation is not borne out by the facts of observation. Many of the mountain regions of Western Europe offer rich pasturage, and therefore the pastoral populations in their vicinity practise that form of nomadism called in French *transhumance*, a term for which we have no English equivalent, although it has been stated recently that there is evidence that the phenomenon once occurred in Highland Scotland. The migrating flocks leave their traces on the mountains in the shape of numerous tracks and roads, now often utilised by tourists. In the Swiss Alps, as we have had often occasion to point out here, nomadism is not confined to the pastoral folk, for indeed purely pastoral peoples hardly exist. The cultivator also moves up and down the mountain slopes according to the season, sowing and reaping his scanty crops where he may. In consequence the hill-sides are scored by tracks, not the roads of the plains, but paths suited to the conditions. Three types of these, M. Biermann points out, can be recognised:—the zig-zag mule track or mere path, used by pack mule or human porter; the straighter, steeper track, traversed by the winter sledges on the upward journey; and the very steep and straight short cut by which the descent is made. In addition, as means of communication to the geographer, must be recognised the wood slides, the small irrigating channels (whose banks, by the way, are often used by lightly loaded persons as short cuts), and finally the erratic paths marked out by the migrating beasts.

Even so in most cases the total mileage of road and track in the mountain is small in proportion to the area, but this, says the author, is to be ascribed to the usual poverty and scanty population of the area, not to the difficulty of construction. As an example he takes the region round Montreux, which has always been populous because the local climate is especially suited for the vine, as well as for fruit-trees and maize, and which has in recent years become one of the great centres of the tourist industry. Here three types of mountain road exist, representing as many periods of social evolution. The first, the ancient road, is straight and steep, sometimes paved, sometimes covered with sand, interrupted at intervals by logs of wood which both diminish the slope by forming steps, and also throw the drainage water to the side. These roads were meant only for mules or pedestrians, and are sometimes replaced by genuine staircases built of stone. Second come the nineteenth-

century roads, which zig-zag up the slopes, but are too steep for anything but light, wheeled vehicles. The twentieth century has found this method of transport too slow and costly, and has "corrected" the roads, giving them a wider sweep and gentler slopes, so that heavily loaded vehicles can be pulled up. The old roads are, however, still kept up and often serve for the down journey. The consequence of the co-existence of the three types has been to give the Montreux region a great wealth of roads, a total of some sixty-two miles for an area of twelve and a half square miles.

The railways have followed a somewhat similar process of evolution in their constantly increasing sacrifice of directness. The first was the Territet-Glion funicular, as straight as one of the primitive mule tracks. But the cable in such cases cannot be indefinitely extended—the principle is only available over short distances. Thus the next railway, that from Glion to Naye, is on the rack and pinion principle, and is zig-zag, not direct. Finally, in the last route, that from Montreux to the Oberland, the rack and pinion, which greatly diminishes speed, has been abandoned, and the slope is circumvented by huge loops, which increase the distance seven-fold. More curious still is the construction of a "corrected" line from Montreux to Glion, which lies alongside the funicular but is four and a half times longer and permits of the transport of merchandise. The total result is to give the Montreux district ten thousand yards (or not far from two miles) of rail to every square mile of area. The conclusion is that in connection with means of communication, as with some other geographical facts, the activity displayed by man is not in direct, but in inverse ratio to the facilities given by nature—the more difficult it is to make roads, the more roads are built.

Tropical Diseases and the Colonisation of Tropical Lands.—Dr. M. Alsberg contributes to a recent issue of the *Geographische Zeitschrift* an article on sanitation in tropical lands, which, although it does not contain anything new, is of interest as a concise summary of recent work. He points out that till recently it was universally assumed by medical men that the tropical climate had a directly injurious effect on the white man. So much was this the case that such diseases as "tropical heart," "tropical liver," and so forth, were described. Recently, however, with the discovery of the organisms associated with malaria in all its forms, with sleeping sickness, etc., this tendency has been entirely reversed, and tropical diseases in general are regarded as having specific causes, like many of the diseases of temperate lands. The problem which remains, and it is one which Dr. Alsberg scarcely considers, is—if such diseases can be eliminated, and the gross tropical death rate thus greatly reduced, will Europeans be able to retain permanently their efficiency in tropical lands?

Dr. Alsberg limits himself to three great tropical diseases—malaria, with blackwater fever, etc., now known to be disseminated by the mosquito *Anopheles*: sleeping sickness, associated chiefly with the tsetse called *Glossina palpalis*, though apparently with other species also: yellow fever, associated with the mosquito *Stegomyia*. As far as the

first and the last kinds of insect are concerned, there is little doubt that great reduction in the total number can be accomplished with comparative ease, and that an associated reduction of the two types of disease is merely a matter of an efficient sanitary service. In regard to sleeping sickness the matter is more difficult, and Dr. Alsberg seems to take rather a more optimistic view of the beneficial effect of clearing away the bush from the streams, and thus of destroying the lurking-places of the tsetse, than is justified by experience. Further, he does not touch upon the difficult question of how the numbers of *Glossina morsitans* are to be reduced if, as now seems certain (see p. 91), this fly also can serve as a carrier of the disease. He makes, however, the rather curious suggestion that the European Powers interested in tropical Africa should combine to limit native trading, and thus diminish the risk of transference of disease from one area to another, as well as checking the trade in strong drink and in gunpowder.

Programme of the British Association.—It is announced that Dr. H. N. Dickson's presidential address to Section E at the Birmingham meeting of the British Association will deal with the increasing recognition of the importance of human geography in the study of social and economic questions. In regard to the programme of the Section, we note first that there are to be two discussions. One, to be held jointly with Section A, is to deal with mathematical geography; the other is to be on the natural regions of the world, and is to be opened by Prof. A. J. Herbertson of Oxford. It is expected that a number of geographers will take part in this latter discussion, which is on a subject to which much attention is being given at the present time. In connection with the mathematical discussion, Capt. Winterbotham is expected to read a paper on the accuracy of the principal triangulation of Great Britain. Among other papers promised are one on Australia by Prof. J. W. Gregory, and one by Mr. I. N. Dracopoli on his recent travels in Jubaland, British East Africa. In the Economic Section Prof. A. W. Kirkaldy is to speak on the economic effects of the opening of the Panama Canal, while in the Zoological Section Prof. Minchin is to lecture on the sleeping sickness problem, both subjects which interest the geographer greatly.

There seems to be at present a prospect that the meeting will prove a great success, and it is hoped by the local committee that the attendance will reach 3000. A very comprehensive programme of excursions has been arranged.

Commercial Geography.

Suggested Cross-Channel Train Ferry.—Recently the proposal to construct a tunnel across the English Channel has been revived, and the Prime Minister, in answer to a deputation, stated a short time ago that the subject was receiving the attention of the Government. It seems probable, however, from the tone of his reply that the proposal, as before, will be rejected on strategical grounds. In these circumstances other

proposals for establishing continuous rail communication between England and France have been receiving attention. One of these is the establishment of a train ferry, and the *Times* has an interesting article on the various train ferries at present in action. None now exists in the United Kingdom, but it will be recalled that till the opening of the Forth Bridge a train ferry existed between Burntisland and Granton, and was not only established at a small cost, but effected a considerable saving of time as compared with ship transport. At present in Europe the most interesting train ferries are those which exist in connection with the Danish State railways. Among the more important of these are that from Korsoer to Nyborg across the Storabelt, at a point where the water is sixteen miles wide; that from Copenhagen to Malmo, a distance of nineteen miles: and that from Warnemunde to Gjedser, a distance of twenty-six miles.

It is this last crossing which offers most analogy to the conditions which would prevail on a cross-channel ferry. It crosses the Baltic at a point where rough water is not infrequent, it connects two different countries, and is part of an international line of communication. The conditions are, however, somewhat simpler in that only a small tidal range has to be allowed for. Of more recent type than the Danish ferries are those which connect the German and Swedish State railways, crossing the Baltic from Trelleborg to Sassnitz. This service was opened in 1909, and has proved a great success; the distance of fifty-eight miles is covered in three and a half hours, and the boats are large and well-appointed.

In America, especially in the region of the Great Lakes, train ferries exist on a much larger scale, and have been found economical and capable of being worked without special difficulties. In some of the American ferries, *e.g.* in New York Bay, considerable tidal range has to be allowed for.

NEW BOOKS.

EUROPE.

Switzerland and the Adjacent Portions of Italy, Savoy, and Tyrol. Handbook for Travellers. By KARL BAEDEKER. Twenty-fifth Edition. London: T. Fisher Unwin, 1913. *Price* 8*s.*

The superior person is fond of asserting that Switzerland has become so vulgarised as to be impossible, but the fact that the twenty-fifth edition of Baedeker's Guide has just appeared shows that the superior person does not count for very much. Indeed, as one turns over the pages and maps of the book, it is difficult to avoid feeling that no other region of the Alps can vie with Switzerland in the splendour of its scenery. Tyrol, it is true, is simpler, more unspoiled, and certainly cheaper, but its mountains for the most part shrink into insignificance beside the central Alps, and the colouring of its strange Dolomites perhaps hardly compensates for the absence of the magnificent glaciers which encircle places like Zermatt.

The new edition of Baedeker is, as usual, thoroughly up to date. We note,

for instance, that the Lotschberg line takes its place without remark among the other mountain railways, as if it had existed since time was, instead of being opened, so to speak, yesterday. It is stated that sleeping-cars are run on the night trains, though we believe that, in point of fact, great difficulties have been experienced in running a night service through the tunnel, difficulties connected especially with the electric traction. The recently opened line from Bevers to Schuls-Tarasp is also described, and generally all notable changes are recorded. The book, in short, shows the usual combination of accuracy and completeness.

An Elementary Historical Geography of the British Isles. By M. S. Elliott, B.A. London: Adam and Charles Black, 1913. *Price* 1*s.* 6*d.*

This is an interesting little book, intended to be used by such pupils in secondary schools as have already an elementary acquaintance with British history and geography. It is very fully illustrated, some of the little sketch-maps being especially attractive. In the preface the author states that historical geography as a subject gives great opportunity for teaching sympathy with other nations and other types of civilisation, and the book seems admirably fitted for this purpose in the way it describes the interrelations of the nations in times of peace—an admirable contrast with that excessive stress upon war which used to be the great blemish of school histories. We recommend the book to the notice of teachers.

The Story of Belfast and its Surroundings. By Mary Lowry. London: Headley Brothers, 1913. *Price* 7*s.* 6*d. net.*

This is a delightful book, which appears at an opportune moment, and will appeal to a much wider circle than those for whom the talented author says it is written, viz. the rising generation of Belfast. To them it will have an irresistible fascination, but it will also attract every student of the history of what is, at least for the time, the most interesting part of an interesting country. The author has imbued herself with the spirit of the locality, and has made a patient and exhaustive study of its history, municipal, political, and ecclesiastical, from which she has chosen a series of most interesting and amusing incidents, told in crisp, fresh, attractive language. She had, of course, an *embarras de richesse* in the shape of materials from which to chose, as the city of Belfast is first mentioned so long ago as the seventh century, although it was not till the twelfth century that it came into prominence. Early in the sixteenth century a Lord Mayor was appointed with the grandiloquent title of the Sovereign; one of his duties was "to attend the Corporation Church every Sunday followed by the burgesses and freemen in state, and every person over thirteen years of age was obliged also to go to church under a penalty of being fined in the sum of sixpence or up to five shillings, which was a serious matter in 1632." His successors undertook other work, as appears from an advertisement in 1767, which announces that "The Company at the Mill Gate will give a benefit to the Poor. Pit and Gallery, 2*s.* 6*d.* each. The Sovereign will attend to take the tickets." The condition of the postal arrangements may be gathered from a notice put up by the postmaster in 1795, "that merchants were requested not to send little boys for letters, but to send proper persons, as little boys behaved very badly and gave great annoyance to the postmaster, who could not be accountable for their conduct." Sir Walter Raleigh, it is true, introduced tobacco into England in 1585, but smoking is shown to have been common in Ireland at least some centuries before that date, for "there is a recumbent figure on a monument erected to the memory of Donogh O'Brien, king

of Thomond, who was killed in the year 1227, and was buried in the Abbey. He is represented lying in the usual position, with the short pipe or 'dudeen' of the Irish in his mouth." In 1800 "two masons struck work and were sent to gaol for three months: and six shoemakers combined to have their wages raised, and they were at once sent to Carrickfergus Gaol, the judge remarking, 'How could trade go on, or trade improve, if such actions were permitted?'" The penalty for breaking or extinguishing a street lamp was six months' imprisonment, and for stealing any part of a lamp transportation for seven years, or public whipping. The book is a delightful treasury of quaint archæological lore, of which we refer to only one more incident, viz., the sacrilegious act of one James Cleland, who, not quite a century ago, introduced six snakes into St. Patrick's country, but happily the shameful crime was abortive. The second half of the book treats in the same way Armagh, Carrickfergus, Bangor, and several other well-known places in the vicinity of Belfast, and is quite as interesting as the first half. It is needless to add that the element of romance is not wanting throughout the book. There are also a great many illustrations from old pictures and prints which are not easily accessible to the ordinary reader. We heartily commend this book to the perusal of our readers.

The Tourists' Russia. By Ruth Kedzie Wood. London: Andrew Melrose, 1912. *Price* 6*s. net.*

This book seems to have been written for American as well as British tourists. It contains a series of very brief sketches of the principal cities and places in Russia, with information as to routes, cost of travel, objects to see, and the like; in brief, a modified Baedeker.

ASIA.

Indian Pages and Pictures. By Michael Myers Shoemaker. New York: E. P. Putnam's Sons; and London: The Knickerbocker Press, 1912. *Price* 10*s.* 6*d. net.*

Mr. Shoemaker is a voluminous writer, and has published many books. In this last one he takes his readers to India, including Kashmir, with regard to which, however, it has to be confessed he has little or nothing fresh to say, fresh at least to British readers. Apparently he is a man of considerable means who is able to tour about in great comfort, and having good introductions he saw to great advantage whatever there is to be seen. His experience as a writer stands him in good stead, and he is never dull. The book is profusely illustrated with photographs of average merit, most of them taken by members of the party.

The Fighting Spirit of Japan. By E. J. Harrison. London: T. Fisher Unwin. *Price* 12*s.* 6*d. net.*

Mr. Harrison's aim in this book is to impart to his readers something of the history and rationale of *Judo*, more familiarly known as Jiujitsu, and he states that he, together with one other foreigner in Japan, has the distinction of holding the rank of *Shodan*, the highest as yet attained by any alien. Mr. Harrison thus brings to his task, not only keen enthusiasm for his subject, but also special knowledge, and the result is one of the most interesting books on Japan that it has recently fallen to our lot to read. Apparently a bout of Judo, as it is practised by the devotees of the cult in Tokio, imposes the severest demands upon the nervous and physical forces of any form of athletics, and we can

recommend any one who cares to study the subject to turn to Mr. Harrison's pages for information. There will be found a very full account of the practice of Judo by the best Japanese experts. We may mention, as a small sample of the contents of the book, the chapter on the art of strangulation, *i.e.* of choking an adversary into a state of insensibility. Arguing from his own experience of being choked in this way, Mr. Harrison concludes that the actual physical sensations felt by the victims of capital punishment by hanging are, on the whole, rather pleasant than otherwise; which is a comforting doctrine for the humanitarian! We find a good deal about the rôle played by transcendentalism in fighting, and, in connection with this part of his subject, the author tells some rather tall stories; as, for instance, that the Japanese Bujin, or fighting man of feudal days, had the power of doing three things. First, he could render himself invisible to his adversary at the moment of combat; second, arrest his opponent's weapon in mid-air; and, third, convert the latter from rage into a condition of fatuous good humour. Some of this savours of the claims which the Chinese Boxers made to miraculous powers, and, probably, in common with most of the arts of Japan, it comes from a similar Chinese origin.

Mr. Harrison tells a good deal about the esoteric aspect of Judo, and he admits that he is himself a convert to occultism. Otherwise one may fairly suppose that he is sometimes laughing in his sleeve at the expense of his readers. The practice of deep-breathing and the development of the abdominal muscles are inculcated, and the notes on these aspects of Judo will be found to be of real value. The rest of the book is made up of chapters on the Japanese equivalent of the Indian Yogi, on the Stage, and other matters. The photographic illustrations are excellent.

How England saved China. By J. Macgowan. London: T. Fisher Unwin, 1913. *Price* 10*s.* 6*d. net.*

This book describes the labour of English missionaries, especially medical missionaries, in China, and the effect of their work in suppressing infanticide, foot-binding, and other barbarous customs. It is written with much fervour of conviction, and contains many photographs illustrating the habits and customs of the people.

GENERAL.

Das Gesetz der Wüstenbildung in Gegenwart und Vorzeit. Von Johannes Walther. Leipzig: Quelle u. Meyer, 1912. *Preis* 12 *marks.*

Professor Walther tells us in his preface that his interest in deserts dates back for twenty-five years, and began with his study of those barren rocks, transitional in date between Palaeozoic and Mesozoic time, which point to desert conditions in the Germany of an earlier period. The first edition of his book, based on desert journeyings in Africa and elsewhere, appeared in 1900, and gave rise to much discussion and some criticism. His desire to reinvestigate certain of the problems connected with deserts led to the planning of a new journey to Egypt and the vicinity, but this plan was not carried out till 1911, and upon that journey this new edition is largely based. It is not a general treatise on deserts in the wide sense, for the author expressly limits himself to the phenomena which he has studied personally, but his observations have been sufficiently widespread to give his book considerable breadth of treatment. His special interest, as indicated above, is in the problem of the extent to which existing deserts throw light upon the deserts of earlier periods of the earth's

history. The book, which has been divided up into a greater number of chapters than the previous issue, consists of four sections: the general characters of deserts; erosion in deserts; deposition: deserts in geological time. It is illustrated by a fine series of photographs, taken from very varied parts of the world, and will be of great value to the physical geographer.

Die Erklärende Beschreibung der Landformen. Von William Morris Davis. Deutsch bearbeitet von Dr. A. Rühl. Leipzig u. Berlin: B. G. Teubner, 1912. *Preis* 11 *Marks.*

In the winter of 1908-9 Professor Davis exchanged professorships with Professor Penck of Berlin, and the present volume is based upon the course of lectures which he delivered at that university. As the title indicates, the book is an elaboration of the thesis, put forward by Professor Davis on a number of occasions, that it is possible to devise a nomenclature for land forms which shall indicate their origin as well as their present characters. This of course involves the further assumption that the agents which model the surface act in a certain limited number of ways, and that any particular land form can be classified as occupying a particular position in a given "cycle of erosion." Though a certain number of the terms introduced or employed by Professor Davis have already won acceptance, many geographers shrink from the terminology in its entirety as having in it something too simple and mechanical for the complexity of nature, and as not being without disadvantages and risks. Both those who are fully and those who are only partially sympathetic will welcome in this book a full exposition of the scheme.

Further, the student will find in Professor Davis's book an instructive account of certain aspects of physical geography, illustrated by examples taken from very varied parts of the earth's surface.

A Handbook of Geography. By A. J. Herbertson, M.A., Ph.D. Vol. I., *General Geography, The British Isles and Europe*; Vol. II., *Asia, Australasia, Africa, and America.* London and Edinburgh: Thomas Nelson and Sons, 1911 and 1913. *Price* 4*s.* 6*d. net, each vol.*

This comprehensive and well-illustrated book is stated in the preface to be written for students and teachers. It includes a somewhat full treatment of the general principles of geography, including physical geography in the narrower sense, biogeography, economic geography, and so forth, followed by detailed discussions of the different regions of the earth. In the regional sections the physical feature of the continents are first fully discussed, and then the political divisions are described. This is of course progress, but we feel that the problem as to how a logical division into natural regions can be reconciled with the utilitarian need of considering political divisions will have to be squarely faced, sooner or later, by geographers. Mr. Dryer, in a text-book recently reviewed here, adopts what seems to us a more logical though less utilitarian standpoint. Some position between his and Dr. Herbertson's will, we think, have to be found, for the student of the latter's book will be disposed to ask why he should trouble, for example, to learn about Laurentian Uplands and Appalachian Highlands, if he is to pass on next to a consideration of provinces and states on traditional lines without reference to such natural regions.

Dr. Herbertson states in his preface that his book was written some time ago, but has been delayed in the press, and has been brought up to date by a pupil. We are sorry, however, to be obliged to indicate that the revision is often partial and imperfect, and in a number of cases seems to consist in the addition of new

figures without removal or alteration of those previously present. In the section relating to Canada and the States this is specially noticeable, owing to the recent censuses, and in the former case to recent modification of provincial boundaries. Thus we note that three different figures are given for the population of Canada, two dated and one undated. Two figures for area are given, with a very considerable difference between them, and the indications as to the areas of the provinces given in the text do not agree with those given in the table on page 496. The census figures of the United States for 1900 are given in two different forms on two pages facing one another (pp. 458 and 459), while still another figure for the same census is given in the text on page 512.

Scientific Papers. By J. Y. Buchanan, M.A., F.R.S. Vol. I. Cambridge: At the University Press, 1913. *Price* 10*s.* 6*d. net.*

Mr. Buchanan reprints here, without alteration, the papers on Oceanographical subjects which he has contributed to various journals, including the *Scottish Geographical Magazine*. Some of these papers deal with matters of great interest, and many will be glad to have them collected together in a convenient form.

The Year-Book of the Scientific and Learned Societies of Great Britain and Ireland. Compiled from official sources. Twenty-ninth Annual Issue. London: Charles Griffiths and Co., 1912. *Price* 7*s.* 6*d. net.*

This very useful compilation gives as usual full accounts of the activities of the various learned societies and bodies, with detailed records of the work accomplished during the session 1911-12.

BOOKS RECEIVED.

La Scandinavie (Norvège-Suède-Danemark-Islande). Par Charles Rabot. Crown Folio. Pp. 68. Illustrated. Paris: Bong et Cie, 1913.

Borrowstounness and District: being Historical Sketches of Kinneil, Carriden, and Bo'ness, 1550-1850. By Thomas J. Salmon. With Illustrations and Maps. Demy 8vo. Pp. x+476. *Price* 6*s. net.* Edinburgh: Wm. Hodge and Co., 1913.

Bennett's Norway: with Through Routes to Sweden and Denmark. Thirtieth edition, revised. With Route Map and four Plans. Crown 8vo. Pp. 256. *Price* 2*s.* 6*d.* London: Simpkin, Marshall and Co., 1913.

Animal Geography: the Faunas of the Natural Regions of the Globe. By Marion I. Newbigin, D.Sc. (The Oxford Geographies.) Crown 8vo. Pp. 238. *Price* 4*s.* 6*d.* Oxford: Clarendon Press, 1913.

The Land of Footprints: Adventures in East Africa. By S. E. White, F.R.G.S. Crown 8vo. Pp. 462. *Price* 2*s. net.* Edinburgh: T. Nelson and Sons, 1913.

The Panama Canal: A History and Description of the Enterprise. By J. Saxon Mills, M.A. With Map and Illustrations. Crown 8vo. Pp. 344. *Price* 2*s. net.* Edinburgh: T. Nelson and Sons, 1913.

The Southland of North America: Rambles and Observations in Central America during the Year 1912. By George Palmer Putnam. With 96 Illustrations from Photographs by the Author, and a Map. Demy 8vo. Pp. xiv+425. *Price* 10*s.* 6*d. net.* London: G. P. Putnam's Sons, 1913.

Switzerland and the Adjacent Portions of Italy, Savoy and Tyrol. Handbook for Travellers. By Karl Baedeker. With 77 Maps, 21 Plans, and 14 Panoramas.

Crown 8vo. Pp. xl + 604. *Price* 8*s. net.* Twenty-fifth Edition. Leipzig: Karl Baedeker, 1913.

Trails and Tramps in Alaska and Newfoundland. By WILLIAM S. THOMAS. With 147 Illustrations from Original Photographs. Demy 8vo. Pp. xvi + 330. *Price* 7*s.* 6*d. net.* London: G. P. Putnam's Sons, 1913.

The Atlas Geographies: A New Visual Atlas and Geography Combined. Part I. *Physical Geography.* By THOMAS FRANKLIN and E. D. GRIFFITHS, B.Sc., F.R.G.S., F.C.S. Crown 4to. Pp. vi + 88. *Price* 1*s.* 6*d. net.* Edinburgh W. and A. K. Johnston, Ltd., 1913.

La Libia. By Prof. GIUSEPPE RICCHIERI. Con Illustrazioni, due carte geografiche in nero e due a colori. Crown 8vo. Pp. 144. Milan: Federazione Italiana delle Biblioteche Popolari, 1913. *Price L.* 1.50.

The Cathedrals of Southern France. By T. FRANCIS BUMPUS. Crown 8vo. Pp. viii + 224. *Price* 6*s. net.* London: T. Werner Laurie, 1913.

Bradshaw's Through Routes to the Chief Cities and Bathing and Health Resorts of the World. Edited by EUSTACE REYNOLDS BALL, F.R.G.S. Maps, Plans, and Vocabularies. Pp. lxviii + 708. *Price* 6*s. net.* London: H. Blacklock and Co., Ltd., 1913.

From a Punjab Pomegranate Grove. By C. C. DYSON. With 14 Illustrations. Demy 8vo. Pp. vii + 289. *Price* 10*s.* 6*d. net.* London: Mills and Boon, Ltd., 1913.

Résultats du Voyage du S.Y. Belgica en 1897-1898-1899, sous le commandement de A. De Gerlache De Gomery. Rapports Scientifiques. 2 Parts. Anvers, 1912.

General Description of the Argentine Republic. Demy 8vo. Pp. 66. Buenos Aires, 1913.

Allgemeine Verkehrsgeographie. Von Dr. KURT HASSERT, Professor der Geographie an der Handels-Hochschule, Köln. Mit 12 Karten und graphischen Darstellungen. 8vo. Pp. viii + 494. *Preis M.* 10. Leipzig: G. J. Göschen, 1913.

Deuxième Expédition Antarctique Française (1908-1910), commandée par le Dr. Jean Charcot. Sciences Naturelles: Documents Scientifiques. 2 Parts. Large 4to. Paris: Masson et Cie, 1913.

Aux Confins de l'Europe et de l'Asie. Par MAURICE RONDET-SAINT. Préface de M. ANDRÉ LEBON. Deuxième édition; un volume en-16. Pp. vi + 334. *Prix* 3 *fr.* 50. Paris: Plon Nourrit et Cie, 1913.

Die Cordillerenstaaten. Von Dr. WILHELM SIEVERS. Erster Band: Bolivia und Peru. Zweiter Band: Ecuador, Colombia, und Venezuela. 12 mo. Pp. 148 und 128. *Preis* 90 *Pfennig.* Berlin: G. J. Göschen, 1913.

The Geography of South Australia: Including the Northern Territory: Historical, Physical, Political, and Commercial. By WALTER HOWCHIN. With an Introduction by Prof. J. W. GREGORY, D.Sc., F.R.S. Crown 8vo. Pp. 320. *Price* 3*s.* 6*d.* Melbourne: Whitcombe and Tombs, Ltd., 1913.

The Geography of Victoria: Historical, Physical, and Commercial. By J. W. GREGORY, D.Sc., F.R.S. New and revised edition. Crown 8vo. Pp. 306. *Price* 3*s.* 6*d.* Melbourne: Whitcombe and Tombs, Ltd., 1913.

Making the Most of the Land. By JAMES LONG. Crown 8vo. Pp. xiv + 282. *Price* 5*s. net.* London: Hodder and Stoughton, 1913.

Plant Life. By J. BRETLAND FARMER, M.A., D.Sc., F.R.S. 12mo. Pp. viii + 255. *Price* 1*s. net.* London: Williams and Norgate, 1913.

Burma Gazetteers. 12 Vols. Rangoon, 1913.

Census of India, 1911. Vol. VI., City of Calcutta. Part I. Report; Part II. Tables. Vol. IV. Baluchistan. Part I. Report; Part II. Tables. Calcutta, 1913. Vol. XX., Kashmir. Part I. Report; Part II. Tables. Lucknow, 1912.

The Currents in the Entrance to the St. Lawrence. From Investigations of the Tidal and Current Survey in the Seasons of 1895, 1911, and 1912. Pp. 50. Ottawa: Department of the Naval Service, 1913.

Chile of To-day: Its Commerce, its Production, and its Resources. By A. Ortúzar. Royal 8vo. Pp. 525. New York: The Tribune Association, 1907.

Diplomatic and Consular Reports.—Trade, etc., of Chicago, 1912 (5095); Trade, etc., of the Netherlands, 1912 (5096); Trade, etc., of Vera Cruz, 1912 (5100); Report on the Swedish Budget, 1914 (5101); Trade of Corea, 1912 (5104); Trade, etc., of Bosnia-Herzegovina, 1912 (5067); Trade, etc., of Alexandria, 1912 (5097); Trade of Genoa, 1912 (5098); Trade, etc., of Roumania, 1911-12 (5102); Trade of Baltimore, 1912 (5103); Trade, etc., of Azores, 1912 (5105); Trade, etc., of Sicily, 1912 (5106); Trade, etc., of Jerusalem, 1912 (5107); Trade, etc., of Lyons, 1912 (5108); Trade, etc., of Corunna, 1912 (5109); Trade of Corsica, 1912 (5111); Trade, etc., of Bolivia, 1912 (5110); Trade of Antofagasta, 1912 (5112); Trade of Wuchow and Nanning, 1912 (5113); Trade of Odessa, 1912 (5114); Trade, etc., of Boston, 1912 (5116); Trade of Hankow, 1912 (5120); Trade, etc., of Dairen, 1912 (5121); Trade, etc., of Chungking, 1912 (5115); Trade of Wuhu, 1912 (5117); Trade of Changsha, 1912 (5119); Trade of Foochow, 1912 (5122); Trade of Harbin, 1912 (5123); Trade of Nanking, 1912 (5124); Trade, etc., of Portland, Oregon, 1912 (5118); Trade, etc., of Rio Grande, 1912 (5130); Trade of Calais, 1912 (5125); Trade of Chinkiang, 1912 (5126); Trade of Malaga, 1912 (5127); Trade of Teng Yueh, 1912 (5128); Trade, etc., of Peru, 1911-12 (5129); Trade, etc., of New York, 1912 (5131); Trade, etc., of Seville, 1912 (5132); Trade of Mengtsz, 1912 (5134); Trade, etc., of the Cyclades, 1912 (5133); Trade of Iquique, 1912 (5135); Trade of France, 1912 (5137); Trade of Lisbon, 1912 (5138); Trade of Réunion, 1912 (5139); Trade, etc., of Rouen, 1912 (5140); Trade of German South-West Africa, 1912 (5141); Trade, etc., of Portugal, 1912 (5142); Trade of Angola, 1912 (5143); Trade of Mannheim, 1912 (5144); Industries and Economic Condition of Turin, 1912 (5148); Budget for 1913 and Finances of Paraguay (5150); Trade, etc., of Porto Rico, 1912 (5154); Trade of Antioquia, 1912 (5146); Trade of Oporto, 1912 (5149); Trade of Hakodate, 1912 (5151); Trade, etc., of Madeira, 1912 (5152); Trade, etc., of the Society Islands, 1912 (5153); Trade, etc., of Tampico, 1912 (5155); Trade of Rome, 1912 (5157); Trade of Salina Cruz, 1912 (5158); Trade of Erzeroum, 1912 (5159); Trade of the State of São Paulo, 1912 (5160); Trade of Basra, 1912 (5168); Trade, etc., of Costa Rica, 1912 (5147); Trade of Venezuela and Caracas, 1911-12 (5156); Trade of Japan, 1912 (5161); Finances of Italy, 1912 (5162); Trade of Abyssinia, 1911-12 (5163); Trade, etc., of Stettin, 1912 (5164); Trade, etc., of the Vilayet of Trebrizond, 1912 (5166); Trade of the Aleppo Vilayet, 1912 (5167).

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NEW MAPS.

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Six-inch and Larger Scale Maps.—Six-inch Maps (Revised). Quarter Sheets

with contours in blue. Price 1s. each. *Lanarkshire.*—23 SE., 26 SW. With contours in red. Price 1s. each. *Lanarkshire.*—15 SW.

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Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 2s. 6d. each. *Clackmannanshire.*—Sheets cxxxiii. 16 NE., SE.; cxxxiv. 5 SW., SE.; 13 NE.; cxl. 5 NW., NE., SW., SE. *Fifeshire.*—Sheets xxii. 12 SW., 15 NE., SW., SE.; xxiii. 9 NW., SW.; xxviii. 14 SE.; xxxvi. 1 SE. *Lanarkshire.*—Sheets v. 12 SE.; vi. 13 SW., SE.; x. 4 NE., SE. *Perthshire.*—Sheets cxxv. 13 SE.; cxxx. 1 NW., SW. *Renfrewshire.*—Sheets ix. 5 NW., SW. *Roxburghshire.*—Sheet xxv. 3 NE. *Stirlingshire.*—Sheets x. 11 NW., NE.; xviii. 13 NE.; xxiv. 1 NW., 4 NW.; 11 NW.; 12 SW.; 16 NW., NE., SW., SE.; xxvii. 6 NW., SW.; xxix. 4 NE., SW., SE.; 8 NW., SW.; xxx. 8 NE., SE.; 12 SW.; xxxi. 9 SE.; 13 SW., SE.

Publications issued from 1st to 30th June 1913 :—

One-inch Map ; third edition. Printed in colours and folded in cover, or flat in sheets. Sheets 115, 116. Price on paper 1s. 6d. Mounted on linen, 2s. Mounted in sections, 2s. 6d. each. Printed in colours and folded in cover, or flat in sheets, Special Map of Aberdeen District. Price on paper 1s. 6d. Mounted on linen 2s. Mounted in sections 2s. 6d.

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Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 3s. each.* *Fifeshire.*—Sheets xxii. 12 NE., SE.; xxviii. 8 NW.; 11 SW.; xxxiv. 16 NW., NE., SW., SE.; xxxv. 12 NE., SW., SE.; xxxvi. 1 SW. *Stirlingshire.*—Sheets xxxi.—9 NW., NE.

* Note.—The price of all 1 : 1250 Scale Enlargements is raised from 2s. 6d. to 3s.

Publications issued from 1st to 31st July 1913 :—

Two-mile Map ; printed in colours, and hills shown by layers, folded in cover, or flat in sheets. Sheet 12. Price, on paper 1s. 6d. ; mounted on linen, 2s. ; mounted in sections, 2s. 6d.

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1 : 2500 Scale Maps (Revised), with houses stippled and with areas. Price 3s. each. *Lanarkshire.*—Sheets ii. 12, 16; iii. 5, 6, 8, 9, 10, 13, 14, 15; xvi. 2. *Renfrewshire.*—Sheet xii. 10.

Note.—There are no coloured editions of these Sheets, and the unrevised impressions have been withdrawn from sale.

Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 3s. each. *Clackmannanshire.*—Sheets cxxxiii. 10 NE.; cxxxix. 2 NE.; 3 NW. *Renfrewshire.*—Sheets ii. 10 NW.

GEOLOGICAL SURVEY OF SCOTLAND.—One-inch Map. New Series, colour printed. Sheet 70. Minginish. 1913. Price 2s. 6d. The Solid shown in Colour. The Drift by symbols in Black.

Ordnance Survey Office, Southampton.

This interesting new sheet contains the Cuillin Hills.

ADMIRALTY CHARTS, SCOTLAND. New Editions.

Firth of Clyde, Western Approaches. 1913. No. 1577. Price 3s.
Firth of Forth, St. Abb's Head to Edinburgh. 1913. No. 114*a*. Price 3s.
River Tay. 1913. No. 1481. Price 3s.
North Sea. 1913. No. 2339. Price 3s.
St. Abb's Head to Aberdeen. 1913. No. 1407. Price 3s.
British Islands. 1913. No. 2. Price 3s. *Admiralty Office, London.*

GLASGOW DISTRICT.—Bartholomew's Motoring and Cycling Map. Reduced from the Ordnance Survey to scale of 2 miles to an inch. Showing roads and distances, with contour colouring. New Edition, 1913. Price 1s. net. Mounted on cloth in case. *John Bartholomew and Co., Edinburgh.*

BRITISH ISLES.—Bartholomew's Contour Motoring Map, showing the best touring roads, with heights and distances. Scale 16 miles to an inch. New edition, 1913. Price 5s. net. Mounted on cloth, dissected.

John Bartholomew and Co., Edinburgh.

NORTH YORKSHIRE.—Graded Road Map on scale of half-an-inch to a mile. Price 1s. net, folded in case. *Gall and Inglis, Edinburgh.*

The roads on this series are revised from special surveys by Mr. Harry R. G. Inglis, and appear to be carefully done.

ITALY.—Testo-Atlante delle Ferrovie e Tramvie Italiane. Leonida Leoni. Prefazione dell' Ing. Pietro Lanino. 1913. Prezzo L. 5.

Istituto Geografico de Agostini, Novara.

This useful little atlas contains provincial maps showing railways and tramways; there are also enlarged maps for the principal towns, together with statistical text.

ITALY.—Carta amministrativa stradale. Scala di 1 : 250.000.

Provincia di Alessandria, Prezzo L. 0.60
„ Milano, „ L. 0.50
„ Padova, „ L. 0.50
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Istituto Geografico de Agostini, Novara.

These maps are on a uniform scale of 4 miles to an inch. They are clear and well adapted for travelling uses. The hills are printed in brown, rivers in blue, and railways in black, whilst the character of the roads is distinguished by red and green lines.

AFRICA

SOUTHERN NIGERIA.—Scale 1 : 125,000, or about 2 miles to an inch. Sheets—Akande, Shaki-West. 1913. Price 1s. 6d. each.

Sold by W. and A. K. Johnston, Limited, Edinburgh and London.

KAMERUN.—Karte in 31 Blätter und 3 Ansatzstucken im Massstabe von 1:300,000, bearbeitet von Max Moisel. Im Auftrage und mit Unterstützung des Reichskolonialamts. 1913. Blatt A 4, Tschad; Blatt B 3, Dikoa; Blatt C 3, Mubi. Price M. 2 each sheet. *Dietrich Reimer (Ernst Vohsen), Berlin.*

AMERICA.

SOUTHERN ALBERTA.—Map showing Disposition of Lands. 1913. Scale 1 : 792,000 or 12½ miles to an inch. J. E. Chalifour, Chief Geographer.
Department of the Interior, Ottawa.

NOVA SCOTIA AND NEW BRUNSWICK.—Standard Topographical Map. Scale 1 : 250,000 or about 4 miles to an inch. Moncton Street, 14 SW. J. E. Chalifour, Chief Geographer. *Department of the Interior, Ottawa.*

ONTARIO.—Topographic Map. Scale 1 : 63,360 or 1 mile to an inch. Sheets—37, St. Thomas; 41, Wallaceburg; 38, Strathroy. (Department of Militia and Defence, 1913.) Price 2s. net each sheet.
Geographical Section, General Staff, London.

UNITED STATES GEOLOGICAL SURVEY.—Geologic Atlas Folios. No. 186, Apishapa, Colorado; No. 183, Llano-Burnet, Texas; No. 184, Kenova, Kentucky. Issued 1912. George Otis Smith, Director.
United States Geological Survey, Washington, D.C.

AUSTRALIA.

NEW SOUTH WALES.—Agricultural Map. 1909.
Issued by the Immigration and Tourist Bureau, Sydney.

NEW SOUTH WALES.—Maps indicating Eastern, Central and Western Divisions, 1911, and Railways, 1911. *Department of Lands Office, Sydney.*

QUEENSLAND.—Geological Sketch Map showing Mineral Localities. Scale 40 miles to an inch. Prepared under the supervision of B. Dunstan, F.G.S., Government Geologist. *Geological Survey Office, Brisbane.*

QUEENSLAND.—Railway Map revised to April 1912.
Office of Government Railways, Brisbane.

SOUTH AUSTRALIA.—Southern Portion. 1912. Scale about 16 miles to an inch. Showing Government Lands. *Surveyor General's Office, Adelaide.*

TASMANIA.—Scale about 12 miles to an inch. 1913. Showing Government Lands. With inset showing Timber Areas.
Surveyor General's Office, Hobart.

VICTORIA.—Maps showing Water Supply and Agriculture, also Railways, Schools, and Temperature. Scale 22 miles to an inch.
Issued by the Intelligence Bureau, Melbourne.

SCHOOL WALL MAPS.

WALES.—Bacon's New Contour Map. Scale 1 : 278,784 or about 4½ miles to an inch. (In Welsh.) Edited by Professor Timothy Lewis, M.A. 1913. Price 7s. 6d. Mounted on cloth, rollers and varnished.
G. W. Bacon and Co., Ltd., London.

NEAR AND MIDDLE EAST.—Bacon's New Contour Map. Scale 1 : 6,000,000. With inset Map of Palestine on scale 1 : 685,000. Price 7s. 6d. Mounted on cloth, rollers and varnished. *G. W. Bacon and Co., Ltd., London.*

The above maps are produced in effective orographical colouring, and are admirably adapted for teaching purposes.

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THE SCOTTISH GEOGRAPHICAL MAGAZINE.

THE WORLD'S RESOURCES AND THE DISTRIBUTION OF MANKIND.[1]

By Professor H. N. Dickson, M.A., D.Sc.

Since the last meeting of this Section the tragic fate of Captain Scott's party, after its successful journey to the South Pole, has become known: and our hopes of welcoming a great leader, after great achievement, have been disappointed. There is no need to repeat here the narrative of events, or to dwell upon the lessons afforded by the skill, and resource, and heroic persistence, which endured to the end. All these have been, or will be, placed upon permanent record. But it is right that we should add our word of appreciation, and proffer our sympathy to those who have suffered loss. It is for us also to take note that this last of the great Antarctic expeditions has not merely reached the Pole, as another has done, but has added, to an extent that few successful exploratory undertakings have ever been able to do, to the sum of scientific geographical knowledge. As the materials secured are worked out it will, I believe, become more and more apparent that few of the physical and biological sciences have not received contributions, and important contributions, of new facts; and also that problems concerning the distribution of the different groups of phenomena and their action and reaction upon one another—the problems which are specially within the domain of the geographer—have not merely been extended in their scope but have been helped towards their solution.

The reaching of the two Poles of the earth brings to a close a long and brilliant chapter in the story of geographical exploration. There is still before us a vista of arduous research in geography, bewildering almost in its extent, in such a degree indeed that "the scope of geography"

[1] Presidential Address to Section E (Geography), at the Birmingham Meeting of the British Association, September 1913.

is in itself a subject of perennial interest But the days of great pioneer discoveries in topography have definitely drawn to their close. We know the size and shape of the earth, at least to a first approximation, and as the map fills up we know that there can be no new continents and no new oceans to discover, although all are still, in a sense, to conquer. Looking back, we find that the qualities of human enterprise and endurance have shown no change; we need no list of names to prove that they were alike in the days of the earliest explorations, of the discovery of the New World or of the sea route to India, of the "Principall Navigations," or of this final attainment of the Poles. The love of adventure and the gifts of courage and endurance have remained the same: the order of discovery has been determined rather by the play of imagination upon accumulated knowledge, suggesting new methods and developing appropriate inventions. Men have dared to do risky things with inadequate appliances, and in doing so have shown how the appliances may be improved and how new enterprises may become possible as well as old ones easier and safer. As we come to the end of these "great explorations," and are restricted more and more to investigations of a less striking sort, it is well to remember that in geography, as in all other sciences, research continues to make as great demands as ever upon those same qualities, and that the same recognition is due to those who continue in patient labour.

When we look into the future of geographical study, it appears that for some time to come we shall still be largely dependent upon work similar to that of the pioneer type to which I have referred, the work of perfecting the geographer's principal weapon, the map. There are many parts of the world about which we can say little except that we know they exist; even the topographical map, or the material for making it, is wanting; and of only a few regions are there really adequate distributional maps of any kind. These matters have been brought before this Section and discussed very fully in recent years, so I need say no more about them, except perhaps to express the hope and belief that the production of topographical maps of difficult regions may soon be greatly facilitated and accelerated with the help of the new art of flying.

I wish to-day rather to ask your attention for a short time to a phase of pioneer exploration which has excited an increasing amount of interest in recent years. Civilised man is, or ought to be, beginning to realise that in reducing more and more of the available surface of the earth to what he considers a habitable condition he is making so much progress, and making it so rapidly, that the problem of finding suitable accommodation for his increasing numbers must become urgent in a few generations. We are getting into the position of the merchant whose trade is constantly expanding and who foresees that his premises will shortly be too small for him. In our case removal to more commodious premises elsewhere seems impossible—we are not likely to find a means of migrating to another planet—so we are driven to consider means of rebuilding on the old site, and so making the best of what we have, that our business may not suffer.

In the type of civilisation with which we are most familiar there are two fundamental elements—supplies of food energy, and supplies of

mechanical energy. Since at present, partly because of geographical conditions, these do not necessarily (or even in general) occur together, there is a third essential factor, the line of transport. It may be of interest to glance, in the cursory manner which is possible upon such occasions, at some geographical points concerning each of these factors, and to hazard some speculations as to the probable course of events in the future.

In his Presidential Address to the British Association at its meeting at Bristol in 1898, Sir William Crookes gave some valuable estimates of the world's supply of wheat, which, as he pointed out, is "the most sustaining food-grain of the great Caucasian race." Founding upon these estimates, he made a forecast of the relations between the probable rates of increase of supply and demand, and concluded that "Should all the wheat-growing countries add to their (producing) area to the utmost capacity, on the most careful calculation the yield would give us only an addition of some 100,000,000 acres, supplying, at the average world-yield of 12·7 bushels to the acre, 1,270,000,000 bushels, just enough to supply the increase of population among bread-eaters till the year 1931." The president then added, "Thirty years is but a day in the life of a nation. Those present who may attend the meeting of the British Association thirty years hence will judge how far my forecasts are justified."

Half the allotted span has now elapsed, and it may be useful to inquire how things are going. Fortunately this can be easily done, up to a certain point at any rate, by reference to a paper published recently by Dr. J. F. Unstead,[1] in which comparisons are given for the decades 1881-90, 1891-1900, and 1901-10. Dr. Unstead shows that the total wheat harvest for the world may be estimated at 2258 million bushels for the first of these periods, 2575 million for the second, and 3233 million for the third, increases of 14 per cent. and 25 per cent. respectively. He points out that the increases were due "mainly to an increased acreage," the areas being 192, 211, and 242 million acres, but also "to some extent (about 8 per cent.) to an increased average yield per acre, for while in the first two periods this was 12 bushels, in the third period it rose to 13 bushels per acre."

If we take the period 1891-1900, as nearly corresponding to Sir William Crookes' initial date, we find that the succeeding period shows an increase of 658 million bushels, or about half the estimated increase required by 1931, and that attained chiefly by "increased acreage."

But signs are not wanting that increase in this way will not go on indefinitely. We note (also from Dr. Unstead's paper) that in the two later periods the percentage of total wheat produced which was exported from the United States fell from 32 to 19, the yield per acre showing an increase meanwhile to 14 bushels. In the Russian Empire the percentage fell from 26 to 23, and only in the youngest of the new countries—Canada, Australia, and the Argentine—do we find large proportional increases. Again, it is significant that in the United Kingdom, which is, and always has been, the most sensitive of all wheat-producing

[1] *Geographical Journal*, August and September 1912.

countries to variations in the floating supply, the *rate* of falling-off of home production shows marked if irregular diminution.

Looking at it in another way, we find (still from Dr. Unstead's figures) that the total amount sent out by the great exporting countries averaged, in 1881-90 295 million bushels, 1891-1900 402 million, 1901-10 532 million. These quantities represent respectively 13·0, 15·6, and 16·1 per cent. of the total production, and it would appear that the percentage available for export from these regions is, for the time at least, approaching its limit, *i.e.* that only about one-sixth of the wheat produced is available from surpluses in the regions of production for making good deficiencies elsewhere.

There is, on the other hand, abundant evidence that improved agriculture is beginning to raise the yield per acre over a large part of the producing area. Between the periods 1881-90 and 1901-10 the average in the United States rose from 12 to 14 bushels; in Russia from 8 to 10; in Australia from 8 to 10. It is likely that, in these last two cases at least, a part of the increase is due merely to more active occupation of fresh lands as well as to the use of more suitable varieties of seed, and the effect of improvements in methods of cultivation alone is more apparent in the older countries. During the same period the average yield increased in the United Kingdom from 28 to 32 bushels, in France from 17 to 20, Holland 27 to 33, Belgium 30 to 35, and it is most marked in the German Empire, for which the figures are 19 and 29.

In another important paper[1] Dr. Unstead has shown that the production of wheat in North America may still, in all likelihood, be very largely increased by merely increasing the area under cultivation, and the reasoning by which he justifies this conclusion certainly holds good over large districts elsewhere. It is of course impossible, in the present crude state of our knowledge of our own planet, to form any accurate estimate of the area which may, by the use of suitable seeds or otherwise, become available for extensive cultivation. But I think it is clear that the available proportion of the total supply from "extensive" sources has reached, or almost reached, its maximum, and that we must depend more and more upon intensive farming, with its greater demands for labour.

The average total area under wheat is estimated by Dr. Unstead as 192 million acres for 1881-90, 211 million acres for 1891-1900, and 242 million acres for 1901-10. Making the guess, for we can make nothing better, that this area may be increased to 300 million acres, and that under ordinary agriculture the average yield may eventually be increased to 20 bushels over the whole, we get an average harvest of 6000 million bushels of wheat. The average wheat-eater consumes, according to Sir William Crookes' figures, about four and a half bushels per annum; but the amount tends to increase. It is as much (according to Dr. Unstead) as six bushels in the United Kingdom and eight bushels in France. Let us take the British figure, and it appears that on a liberal estimate

[1] *Geographical Journal*, April and May 1912.

the earth may in the end be able to feed permanently 1000 million wheat-eaters. If prophecies based on population statistics are trustworthy, the crisis will be upon us before the end of this century. After that we must either depend upon some substitute to reduce the consumption per head of the staple foodstuff, or we must take to intensive farming of the most strenuous sort, absorbing enormous quantities of labour and introducing, sooner or later, serious difficulties connected with plant-food. We leave the possibility of diminishing the rate of increase in the number of bread-eaters out of account.

We gather, then, that the estimates formed in 1898 are in the main correct, and the wheat problem must become one of urgency at no distant date, although actual shortage of food is a long way off. What is of more immediate significance to the geographer is the element of change, of return to earlier conditions, which is emerging even at the present time. If we admit, as I think we must do, that the days of increase of extensive farming on new land are drawing to a close, then we admit that the assignment of special areas for the production of the food-supply of other distant areas is also coming to its end. The opening up of such areas, in which a sparse population produces food in quantities largely in excess of its own needs, has been the characteristic of our time, but it must give place to a more uniform distribution of things, tending always to the condition of a moderately dense population, more uniformly distributed over large areas, capable of providing the increased labour necessary for the higher type of cultivation, and self-supporting in respect of grain-food at least. We observe in passing that the colonial system of our time only became possible on the large scale with the invention of the steam locomotive, and that the introduction of railway systems in the appropriate regions, and the first tapping of nearly all such regions on the globe, has taken less than a century.

Concentration in special areas of settlement, formerly chiefly effected for military reasons, has in modern times been determined more and more by the distribution of supplies of energy. The position of the manufacturing district is primarily determined by the supply of coal. Other forms of energy are, no doubt, available, but, as Sir William Ramsay showed in his Presidential Address at the Portsmouth meeting in 1911, we must in all probability look to coal as being the chief permanent source.

In the early days of manufacturing industries the main difficulties arose from defective land transport. The first growth of the industrial system, therefore, took place where sea transport was relatively easy: raw material produced in a region near a coast was carried to a coalfield also near a coast, just as in the times when military power was chiefly a matter of "natural defences," the centre of power and the food-producing colony had to be mutually accessible. Hence the Atlantic took the place of the Mediterranean, Great Britain eventually succeeded Rome, and eastern North America became the counterpart of Northern Africa. It is to this, perhaps more than to anything else, that we in Britain owe our tremendous start amongst the industrial nations, and we observe that we used it to provide less favoured nations with the means of improving

their system of land transport, as well as actually to manufacture imported raw material and redistribute the products.

But there is, of course, this difference between the supply of foodstuff (or even military power) and mechanical energy, that in the case of coal at least it is necessary to live entirely upon capital; the storing up of energy in new coalfields goes on so slowly in comparison with our rate of expenditure that it may be altogether neglected. Now in this country we began to use coal on a large scale a little more than a century ago. Our present yearly consumption is of the order of 300 millions of tons, and it is computed[1] that at the present rate of increase "the whole of our available supply will be exhausted in 170 years." With regard to the rest of the world we cannot, from lack of *data*, make even the broad assumptions that were possible in the case of wheat supply, and for that and other reasons it is therefore impossible even to guess at the time which must elapse before a universal dearth of coal becomes imminent; it is perhaps sufficient to observe that to the best of our knowledge and belief one of the world's largest groups of coalfields (our own) is not likely to last three centuries in all.

Here again the present interest lies rather in the phases of change which are actually with us. During the first stages of the manufacturing period energy in any form was exceedingly difficult to transport, and this led to intense concentration. Coal was taken from the most accessible coalfield and used, as far as possible, on the spot. It was chiefly converted into mechanical energy by means of the steam engine, an extremely wasteful apparatus in small units, hence still further concentration; thus the steam engine is responsible in part for the factory system in its worst aspect. The less accessible coalfields were neglected. Also, the only other really available source of energy—water-power—remained unused, because the difficulties in the way of utilising movements of large quantities of water through small vertical distances (as in tidal movements) are enormous; the only easily applied source occurs where comparatively small quantities of water fall through considerable vertical distances, as in the case of waterfalls. But, arising from the geographical conditions, waterfalls (with rare exceptions such as Niagara) occur in the "torrential" part of the typical river-course, perhaps far from the sea, almost certainly in a region too broken in surface to allow of easy communication or even of industrial settlement of any kind.

However accessible a coalfield may be to begin with, it sooner or later becomes inaccessible in another way, as the coal near the surface is exhausted and the workings get deeper. No doubt the evil day is postponed for a time by improvements in methods of mining—a sort of intensive cultivation—but as we can put nothing back the end must be the same, and successful competition with more remote but more superficial deposits becomes impossible. And every improvement in land transport favours the geographically less accessible coalfields.

From this point of view it is impossible to overestimate the import-

[1] *General Report of the Royal Commission on Coal Supplies*, 1906.

ance of what is to all intents and purposes a new departure of the same order of magnitude as the discovery of the art of smelting iron with coal, or the invention of the steam engine, or of the steam locomotive. I mean the conversion of energy into electricity, and its transmission in that form (at small cost and with small loss) through great distances. First we have the immediately increased availability of the great sources of cheap power in waterfalls. The energy may be transmitted through comparatively small distances and converted into heat in the electric furnace, making it possible to smelt economically the most refractory ores, as those of aluminium, and converting such unlikely places as the coast of Norway or the West Highlands of Scotland into manufacturing districts. Or it may be transmitted through greater distances to regions producing quantities of raw materials, distributed there widespread to manufacturing centres, and re-converted into mechanical energy. The Plain of Lombardy produces raw material in abundance, but Italy has no coal supply. The waterfalls of the Alps yield much energy, and this transmitted in the form of electricity, in some cases for great distances, is converting Northern Italy into one of the world's great industrial regions. Chisholm gives an estimate of a possible supply of power amounting to 3,000,000 horse-power, and says that of this about one-tenth was already being utilised in the year 1900.

But assuming again, with Sir William Ramsay, that coal must continue to be the chief source of energy, it is clear that the question of accessibility now wears an entirely different aspect. It is not altogether beyond reason to imagine that the necessity for mining, as such, might entirely disappear, the coal being burnt *in situ* and energy converted directly into electricity. In this way some coalfields might conceivably be exhausted to their last pound without serious increase in the cost of getting. But for the present it is enough to note that, however inaccessible any coalfield may be from supplies of raw material, it is only necessary to establish generating stations at the pit's mouth and transport the energy to where it can be used. One may imagine, for example, vast manufactures carried on in what are now the immense agricultural regions of China, worked by power supplied from the great coal deposits of Shan-si.

There is, however, another peculiarity of electrical power which will exercise increasing influence upon the geographical distribution of industries. The small electric motor is a much more efficient apparatus than the small steam engine. We are, accordingly, already becoming familiar with the great factory in which, instead of all tools being huddled together to save loss through shafting and belting, and all kept running all the time, whether busy or not (because the main engine must be run), each tool stands by itself and is worked by its own motor, and that only when it is wanted. Another of the causes of concentration of manufacturing industry is therefore reduced in importance. We may expect to see the effects of this becoming more and more marked as time goes on, and other forces working towards uniform distribution make themselves more felt.

The points to be emphasised so far, then, are, first, that the time

when the available areas whence food supply, as represented by wheat, is derived are likely to be taxed to their full capacity within a period of about the same length as that during which the modern colonial system has been developing in the past: secondly, that cheap supplies of energy may continue for a longer time, although eventually they must greatly diminish; and, thirdly, there must begin in the near future a great equalisation in the distribution of population. This equalisation must arise from a number of causes. More intensive cultivation will increase the amount of labour required in agriculture, and there will be less difference in the cost of production and yield due to differences of soil and climate. Manufacturing industries will be more uniformly distributed, because energy, obtained from a larger number of sources in the less accessible places, will be distributed over an increased number of centres. The distinction between agricultural and industrial regions will tend to become less and less clearly marked, and will eventually almost disappear in many parts of the world.

The effect of this upon the third element is of first-rate importance. It is clear that as the process of equalisation goes on the relative amount of long-distance transport will diminish, for each district will tend more and more to produce its own supply of staple food and carry on its own principal manufactures. This result will naturally be most marked in what we may call the "east-and-west" transport, for as climatic controls primarily follow the parallels of latitude, the great *quantitative* trade, the flow of food-stuffs and manufactured articles to and fro between peoples of like habits and modes of life, runs primarily east and west. Thus the transcontinental functions of the great North American and Eurasian railways, the east-and-west systems of the inland waterways of the two continents, and the connecting-links furnished by the great ocean ferries, must become of relatively less importance.

The various stages may be represented, perhaps, in some such manner as this. If **I** is the cost of producing a thing locally at a place A by intensive cultivation or what corresponds to it, if **E** is the cost of producing the same thing at a distant place B, and **T** the cost of transporting it to A, then at A we may at some point of time have a more or less close approximation to

$$\mathbf{I} = \mathbf{E} + \mathbf{T}.$$

We have seen that in this country, for example, **I** has been greater than **E**+**T** for wheat ever since, say, the introduction of railways in North America, that the excess tends steadily to diminish, and that however much it may be possible to reduce **T** either by devising cheaper modes of transport or by shortening the distance through which wheat is transported, **E**+**T** must become greater than **I**, and it will pay us to grow all or most of our own wheat. Conversely, in the seventies of last century **I** was greater than **E**+**T** in North America and Germany for such things as steel rails and rolling-stock, which we in this country were cultivating "extensively" at the time on more accessible coalfields, with more skilled labour and better organisation than could be found elsewhere. In many cases the positions are now, as we know, reversed, but geographically **I** must win all round in the long run.

In the case of transport between points in different latitudes, the conditions are, of course, altogether dissimilar, for in this case commodities consist of foodstuffs, or raw materials, or manufactured articles, which may be termed luxuries, in the sense that their use is scarcely known until cheap transport makes them easily accessible, when they rapidly become "necessaries of life." Of these the most familiar examples are tea, coffee, cocoa, and bananas, indiarubber and manufactured cotton goods. There is here, of course, always the possibility that wheat as a staple might be replaced by a foodstuff produced in the tropics, and it would be extremely interesting to study the geographical consequences of such an event as one-half of the surface of the earth suddenly coming to help in feeding the two quarters on either side: but for many reasons, which I need not go into here, such a consummation is exceedingly unlikely. What seems more probable is that the trade between different latitudes will continue to be characterised specially by its variety, the variety doubtless increasing, and the quantity increasing in still larger measure. The chief modification in the future may perhaps be looked for in the occasional transference of manufactures of raw materials produced in the tropics to places within the tropics, especially when the manufactured article is itself largely consumed near regions of production. The necessary condition here is a region, such as, *e.g.*, the monsoon region, in which there is sufficient variation in the seasons to make the native population laborious; for then, and apparently only then, is it possible to secure sufficient industry and skill by training, and therefore to be able to yield to the ever-growing pressure in more temperate latitudes due to increased cost of labour. The best examples of this to-day are probably the familiar ones of cotton and jute manufacture in India. With certain limitations, manufacturing trade of this kind is, however, likely to continue between temperate and strictly tropical regions, where the climate is so uniform throughout the year that the native has no incentive to work. There the collection of the raw material is as much as, or even more than can be looked for—as in the case of mahogany or wild rubber. Where raw material has to be cultivated—as cotton, cultivated rubber, etc.—the raw material has to be produced in regions more of the monsoon type, but it will probably—perhaps as much for economic as geographical reasons—be manufactured at some centre in the temperate zones, and the finished product transported thence, when necessary, to the point of consumption in the tropics.

We are here, however, specially liable to grave disturbances of distribution arising from invention of new machinery or new chemical methods; one need only mention the production of sugar or indigo. Another aspect of this which is not without importance may perhaps be referred to here, although it means the transference of certain industries to more accessible regions merely, rather than a definite change of such an element as latitude. I have in mind the sudden conversion of an industry in which much labour is expended on a small amount of raw material into one where much raw material is consumed, and by the application of power-driven machinery the labour required is greatly

diminished. One remembers when a fifty-shilling Swiss watch, although then still by tradition regarded as sufficiently valuable to deserve enclosure in a case constructed of a precious metal, was considered a marvel of cheapness. American machine-made watches, produced by the ton, are now encased in the baser metals and sold at some five shillings each, and the watch-making industry has ceased to be specially suited to mountainous districts.

In considering the differences which seem likely to arise in what we may call the regional pressures of one kind and another, pressures which are relieved or adjusted by and along certain lines of transport, I have made a primary distinction between "east-and-west" and "north-and-south" types, because both in matters of food-supply and in the modes of life which control the nature of the demand for manufactured articles climate is eventually the dominant factor; and, as I have said, climate varies primarily with latitude. This is true specially of atmospheric temperature; but temperature varies also with altitude, or height above the level of the sea. To a less extent rainfall, the other great element of climate, varies with altitude, but the variation is much more irregular. More important in this case is the influence of the distribution of land and sea, and more especially the configuration of the land surface, the tendency here being sometimes to strengthen the latitude effect where a continuous ridge is interposed, as in Asia, practically cutting off "north-and-south" communication altogether along a certain line, emphasising the parallel-strip arrangement running east and west to the north of the line, and inducing the quite special conditions of the monsoon region to the south of it. We may contrast this with the effect of a "north-and-south" structure, which (in temperate latitudes especially) tends to swing what we may call the regional lines round till they cross the parallels of latitude obliquely. This is typically illustrated in North America, where the angle is locally sometimes nearly a right angle. It follows, therefore, that the contrast of "east-and-west" and "north-and-south" lines, which I have here used for purposes of illustration, is necessarily extremely crude, and one of the most pressing duties of geographers at the present moment is to elaborate a more satisfactory method of classification. I am very glad that we are to have a discussion on "Natural Regions" at one of our sederunts. Perhaps I may be permitted to express the hope that we shall concern ourselves with the types of region we want, their structure or "grain," and their relative positions, rather than with the precise delimitation of their boundaries, to which I think we have sometimes been inclined, for educational purposes, to give a little too much attention.

Before leaving this I should like to add, speaking still in terms of "east-and-west" and "north-and-south," one word more about the essentially east-and-west structure of the Old World. I have already referred to the great central axis of Asia. This axis is prolonged westward through Europe, but it is cut through and broken to such an extent that we may include the Mediterranean region with the area lying further north, to which indeed it geographically belongs, in any discussion of this sort. But the Mediterranean region is bounded on the other

side by the Sahara, and none of our modern inventions facilitating transport has made any impression upon the dry desert; nor does it seem likely that such a desert will ever become a less formidable barrier than a great mountain mass or range. We may conclude, then, that in so far as the Old World is concerned, the "north-and-south" transport can never be carried on as freely as it may in the New, but only through certain weak points, or "round the ends," *i.e.* by sea. It may be further pointed out that the land areas in the southern hemisphere are so narrow that they will scarcely enter into the "east-and-west" category at all—the transcontinental railway as understood in the northern hemisphere cannot exist; it is scarcely a pioneer system, but rather comes into existence as a later by-product of local east-and-west lines, as in Africa.

These geographical facts must exercise a profound influence upon the future of the British Isles. Trade south of the great dividing line must always be to a large extent of the "north-and-south" type, and the British Isles stand practically at the western end of the great natural barrier. From their position the British Isles will always be a centre of immense importance in *entrepôt* trade, importing commodities from "south" and distributing "east and west," and similarly in the reverse direction. This movement will be permanent, and will increase in volume long after the present type of purely "east-and-west" trade has become relatively less important than it is now, and long after the British Isles have ceased to have any of the special advantages for manufacturing industries which are due to their own resources either in the way of energy or of raw material. We can well imagine, however, that this permanent advantage of position will react favourably, if indirectly, upon certain types of our manufactures, at least for a very long time to come.

Reverting briefly to the equalisation of the distribution of population in the wheat-producing areas and the causes which are now at work in this direction, it is interesting to inquire how geographical conditions are likely to influence this on the smaller scale. We may suppose that the production of staple foodstuffs must always be more uniformly distributed than the manufacture of raw materials, or the production of the raw materials themselves, for the most important raw materials of vegetable origin (as cotton, rubber, etc.) demand special climatic conditions, and, apart from the distribution of energy, manufacturing industries are strongly influenced by the distribution of mineral deposits, providing metals for machinery, and so on. It may, however, be remarked that the useful metals, such as iron, are widely distributed in or near regions which are not as a rule unfavourable to agriculture. Nevertheless, the fact remains that while a more uniform distribution is necessary and inevitable in the case of agriculture, many of the conditions of industrial and social life are in favour of concentration; the electrical transmission of energy removes, in whole or in part, only one or two of the centripetal forces. The general result might be an approximation to the conditions occurring in many parts of the monsoon areas—a number of fairly large towns pretty evenly distributed over a given agricultural area, and each drawing its main food supplies from the region surrounding it. The positions of such towns would be determined much more by industrial

conditions, and less by military conditions, than in the past (military power being in these days mobile, and not fixed); but the result would on a larger scale be of the same type as was developed in the central counties of England, which, as Mackinder has pointed out, are of almost equal size and take the name of the county town. Concentration within the towns would, of course, be less severe than in the early days of manufacturing industry. Each town would require a very elaborate and highly organised system of local transport, touching all points of its agricultural area, in addition to lines of communication with other towns and with the great "north-and-south" lines of world-wide commerce, but these outside lines would be relatively of less importance than they are now. We note that the more perfect the system of local transport the less the need for points of intermediate exchange. The village and the local market-town will be "sleepy" or decadent as they are now, but for a different reason: the symptoms are at present visible mainly because the country round about such local centres is overwhelmed by the great lines of transport which pass through them: they will survive for a time through inertia and the ease of foreign investment of capital. The effect of this influence is already apparent since the advent of the "commercial motor," but up to the present it has been more in the direction of distributing from the towns than collecting to them, producing a kind of "suburbanisation" which throws things still further out of balance. The importance of the road motor in relation to the future development of the food-producing area is incalculable. It has long been clear that the railway of the type required for the great through lines of fast transport is ill-adapted for the detailed work of a small district, and the "light" railway solves little and introduces many complications. The problem of determining the direction and capacity of a system of roads adequate to any particular region is at this stage one of extraordinary difficulty; experiments are exceedingly costly, and we have as yet little experience of a satisfactory kind to guide us. The geographer, if he will, can here be of considerable service to the engineer.

In the same connexion, the development of the agricultural area supplying an industrial centre offers many difficult problems in relation to what may be called accessory products, more especially those of a perishable nature, such as meat and milk. In the case of meat the present position is that much land which may eventually become available for grain crops is used for grazing, or cattle are fed on some grain, like maize, which is difficult to transport or is not satisfactory for bread-making. The meat is then temporarily deprived of its perishable property by refrigeration, and does not suffer in transport. Modern refrigerating machinery is elaborate and complicated, and more suited to use on board ship than on any kind of land transport. Hence the most convenient regions for producing meat for export are those near the sea-coast, such as occur in the Argentine or the Canterbury plains of New Zealand. The case is similar to that of the "accessible" coalfield. Possibly the preserving processes may be simplified and cheapened, making overland transport easier, but the fact that it usually takes a good deal of land to produce a comparatively small quantity of meat will make the difficulty

greater as land becomes more valuable. Cow's milk, which in modern times has become a "necessary of life" in most parts of the civilised world, is in much the same category as meat, except that difficulties of preservation, and therefore of transport, are even greater. That the problem has not become acute is largely due to the growth of the long-transport system available for wheat, which has enabled land round the great centres of population to be devoted to dairy produce. If we are right in supposing that this state of things cannot be permanent the difficulty of milk supply must increase, although relieved somewhat by the less intense concentration in the towns; unless, as seems not unlikely, a wholly successful method of permanent preservation is devised.

In determining the positions of the main centres, or rather, in sub-dividing the larger areas for the distribution of towns with their supporting and dependent districts, water supply must be one of the chief factors in the future, as it has been in the past; and in the case of industrial centres the quality as well as the quantity of water has to be considered. A fundamental division here would probably be into districts having a natural local supply, probably of hard water, and districts in which the supply must be obtained from a distance. In the latter case engineering works of great magnitude must often be involved, and the question of total resources available in one district for the supply of another must be much more fully investigated than it has been. In many cases, as in this country, the protection of such resources pending investigation is already much needed. It is worth noting that the question may often be closely related to the development and transmission of electrical energy from waterfalls, and the two problems might in such cases be dealt with together. Much may be learned about the relation of water supply to distribution of population from a study of history, and a more active prosecution of combined historical and geographical research would, I believe, furnish useful material in this connexion, besides throwing interesting light on many historical questions.

Continued exchange of the "north-and-south" type and at least a part of that described as "east-and-west" gives permanence to a certain number of points where, so far as can be seen, there must always be a change in the mode of transport. It is not likely that we shall have heavy freight-carrying monsters in the air for a long time to come, and until we have the aerial "tramp" transport must be effected on the surfaces of land and sea. However much we may improve and cheapen land transport it cannot in the nature of things become as cheap as transport by sea. For on land the essential idea is always that of a prepared road of some kind, and, as Chisholm has pointed out, no road can carry more than a certain amount; traffic beyond a certain quantity constantly requires the construction of new roads. It follows, then, that no device is likely to provide transport indifferently over land and sea, and the seaport has in consequence inherent elements of permanence. Improved and cheapened land transport increases the economy arising from the employment of large ships rather than small ones, for not only does transport inland become relatively more important, but distribution along a coast from one large seaport becomes as easy as from a number of

small coastal towns. Hence the conditions are in favour of the growth of a comparatively small number of immense seaport cities like London and New York, in which there must be great concentration not merely of work directly connected with shipping, but of commercial and financial interests of all sorts. The seaport is, in fact, the type of great city which seems likely to increase continually in size, and provision for its needs cannot in general be made from the region immediately surrounding it, as in the case of towns of other kinds. In special cases there is also, no doubt, permanent need of large inland centres of the type of the "railway creation," but under severe geographic control these must depend very much on the nature and efficiency of the systems of land transport. It is not too much to say (for we possess some evidence of it already) that the number of distinct geographical causes which give rise to the establishment and maintenance of individual great cities is steadily diminishing, but that the large seaport is a permanent and increasing necessity. It follows that aggregations of the type of London and Liverpool, Glasgow and Belfast will always be amongst the chief things to be reckoned with in these islands, irrespective of local coal supply or accessory manufacturing industries, which may decay through exhaustion.

I have attempted in what precedes to draw attention once more to certain matters for which it seems strangely difficult to get a hearing. What it amounts to is this, that as far as our information goes the development of the steamship and the railway, and the universal introduction of machinery which has arisen from it, have so increased the demand made by man upon the earth's resources that in less than a century they will have become fully taxed. When colonisation and settlement in a new country proceeded slowly and laboriously, extending centrifugally from one or two favourable spots on the coast, it took a matter of four centuries to open up a region the size of England. Now we do as much for a continent like North America in about as many decades. In the first case it was not worth troubling about the exhaustion of resources, for they were scarcely more than touched, and even if they were exhausted there were other whole continents to conquer. But now, so far as our information goes, we are already making serious inroads upon the resources of the whole earth. One has no desire to sound an unduly alarmist note, or to suggest that we are in imminent danger of starvation, but surely it would be well, even on the suspicion, to see if our information is adequate and reliable and if our conclusions are correct; and not merely to drift in a manner which was justifiable enough in Saxon times, but which, at the rate things are going now, may land us unexpectedly in difficulties of appalling magnitude.

What is wanted is that we should seriously address ourselves to a stock-taking of our resources. A beginning has been made with a great map on the scale of one to a million, but that is not sufficient; we should vigorously proceed with the collection and discussion of geographical *data* of all kinds, so that the major natural distributions shall be adequately known, and not merely those parts which commend themselves, for one reason or another, to special national or private enterprises. The method of

Government survey, employed in most civilised countries for the construction of maps, the examination of geological structure or the observation of weather and climate, is satisfactory as far as it goes, but it should go further, and be made to include such things as vegetation, water supply, supplies of energy of all kinds, and, what is quite as important, the bearings of one element upon others under different conditions. Much, if not most, of the work of collecting *data* would naturally be done as it is now by experts in the special branches of knowledge, but it is essential that there should be a definite plan of a *geographical* survey as a whole, in order that the regional or distributional aspect should never be lost sight of. I may venture to suggest that a committee formed jointly by the great national geographical societies, or by the International Geographical Congress, might be entrusted with the work of formulating some such uniform plan and suggesting practicable methods of carrying it out. It should not be impossible to secure international co-operation, for there is no need to investigate too closely the secrets of any one's particular private vineyard—it is merely a question of doing thoroughly and systematically what is already done in some regions, sometimes thoroughly, but not systematically. We should thus arrive eventually at uniform methods of stock-taking, and the actual operations could be carried on as opportunity offered and indifference or opposition was overcome by the increasing need for information. Eventually we shall find that "country-planning" will become as important as town-planning, but it will be a more complex business, and it will not be possible to get the facts together in a hurry. And in the meanwhile increased geographical knowledge will yield scientific results of much significance about such matters as distribution of populations and industries, and the degree of adjustment to new conditions which occurs or is possible in different regions and amongst different peoples. Primary surveys on the large scale are specially important in new regions, but the best methods of developing such areas and of adjusting distributions in old areas to new economic conditions are to be discovered by extending the detailed surveys of small districts. An example of how this may be done has been given by Dr. Mill in his *Fragment of the Geography of Sussex*. Dr. Mill's methods have been successfully applied by individual investigators to other districts, but a definitely organised system, marked out on a carefully matured uniform plan, is necessary if the results are to be fully comparable. The schools of geography in this country have already done a good deal of local geography of this type, and could give much valuable assistance if the work were organised beforehand on an adequate scale.

But in whatever way and on whatever scale the work is done, it must be clearly understood that no partial study from the physical, or biological, or historical, or economic point of view will ever suffice. The urgent matters are questions of distribution upon the surface of the earth, and their elucidation is not the special business of the physicist, or the biologist, or the historian, or the economist, but of the geographer.

THE DOMINION OF CANADA: A STUDY IN REGIONAL GEOGRAPHY.[1]

By Arthur Silva White, Hon. F.R.S.G.S.

(*With Maps.*)

PART I. THE COUNTRY.

Unveiling of the New World.

The geographical characteristics of the American continents, and the unveiling of these to the Old World, present an instructive and fascinating study. In physical structure, in relief and drainage, and in general configuration the resemblance of the Americas is close; in climatic conditions, the contrast is no less sharp. Pear-shaped in outline, North and South America resemble each other, as well as the land-masses of Africa and India, by having their broadest lands in the north. Both continents are ridged up on their western sides by a massive backbone of mountain ranges and highlands, which differentiate the climates of the Atlantic and Pacific coastlands; and, in each, two vast river-systems discharge south and east into the Atlantic basin by long and gentle slopes. Their unveiling, like their climates—and, indeed, largely because of these—may be contrasted broadly: North America was opened up from the south and east; South America, mainly from the north and west. The early voyagers, explorers, and settlers acted each according to their kind: the English, clinging to the coasts, occupied islands and peninsular lands; the Dutch entrenched themselves on the Hudson at New Amsterdam (New York): the French boldly penetrated the great arteries of North America—the St. Lawrence and the Mississippi; while the Portuguese and Spaniards, in the Eastern and Western worlds of the Papal award, sought wealth in warmer climes and richer lands. Their common objective, however, was the fabulous wealth of the Indies, search for which was pushed forward in every direction. Thus it came about that the barren lands of Africa were passed by and the uninviting lands of North America received less attention than the West India Islands and tropical South America. Before the first quarter of the sixteenth century had passed, the early voyagers had revealed the great length of the Atlantic coastline of the Americas, while the tropical lands of Central and South America were being opened up, somewhat roughly, to the policy of Europe.

Historical Retrospect.

The rise of Canada from its obscurity, half a century ago, to its position as the Premier Colony of the British Empire is, perhaps, the most notable achievement in British colonial expansion. The disunity of the early days—due to mutual misunderstandings between the scattered

[1] Copyright: Arthur Silva White, 1913.

Provinces, separate Customs, and the neglect of communications—has been overcome by co-operation and by loyalty to English ideals of life and government. A supreme faith in herself and in the development of her natural resources has been, and remains, the guiding spirit of Canada.

The voyages of Columbus, Vasco da Gama, and Magellan stimulated others to seek for a northern passage to Asia, both eastward and westward; and scientific exploration of the Arctic Regions became eventually a great national undertaking, in which the British Navy co-operated. John Cabot, in 1497, was the pioneer. His search for the North-West Passage led to the discovery of Newfoundland and the continent of North America; and he was followed by the Portuguese voyager, Corte Real. In 1576, the quest was taken up by Martin Frobisher, an English navigator and explorer, who sailed westward until brought up in Frobisher Bay (Baffin Land), thereby narrowly missing the discovery of Hudson Strait. His return and subsequent attempt to found a settlement there yielded no result. Other English navigators followed, including John Davis and William Baffin: but it was left to the ill-fated Henry Hudson, in 1610, to enter the strait that bears his name, and to outline the southern limit of Hudson Bay. Considering the small vessels and the scanty crews that took part in this search for a North-West Passage, it is surprising that the early navigators accomplished so much.

The Portuguese were equally active in seeking a short cut to their Eastern colonies. France, too, whose navigators played the leading rôle in the sixteenth century, made determined attempts to penetrate westwards. Several expeditions left Norman and Breton seaports for the New Lands, one of which (under Denys of Honfleur) is said to have reached the St. Lawrence as early as 1506. The true discoverer of Canada—who named it New France—was Jacques Cartier, a Breton sailor. In 1534 and 1535, he entered the St. Lawrence and was well received by the Indians at Quebec and Montreal. Subsequently, in 1541, he and De Roberval made the first serious attempt at colonisation, at Cap Rouge: but it failed ignominiously. More than fifty years passed before permanent settlement began under the brilliant leadership of Champlain, who founded Quebec in 1608.

England—particularly Devonshire—in the sixteenth century produced men who were filled with the spirit of adventure, and who boldly faced the limitless horizon in search of it. Of such was Sir Francis Drake, the master-spirit in the overthrow of the Armada and the first Englishman to circumnavigate the globe. Drake, from the heights above Panama, "stared on the Pacific": and his vow "to sail an English ship in those seas" was nobly redeemed on his voyage of discovery, which lasted nearly three years.[1]

Among other Elizabethan navigators, none stand out with greater distinction than Sir Humphrey Gilbert and Sir Walter Raleigh—both pioneers in the foundation of empire in British North America—who

[1] Mrs. Nuttall, an American archæologist, made a communication to the Hakluyt Society (Oct. 9, 1912), based on some recently discovered documents, which would appear to confirm the discovery of Cape Horn by Drake, and to throw new light on many incidents in his career.

made serious attempts at colonisation. In 1578, Gilbert obtained a patent "for the inhabiting and planting of our people in America," and, in virtue of this, he proclaimed the Queen's sovereignty over Newfoundland. He, however, was pursued by misfortune. Returning home, his small ship (the *Squirrel*, 10 tons) foundered in mid-Atlantic. "We are as near heaven by sea as by land" was his last utterance, so characteristic of the man and of his times.

Raleigh's attempts at colonisation began, a year after Gilbert's loss, in Virginia and ended ingloriously in Guiana. But, when war with Spain defeated the first attempt to colonise Virginia, freebooting became the order of the day. Private enterprise, under Royal licence, entered too much into these early colonial adventures, to lead to any permanent results. Later, when commercial companies were formed, more systematic and thorough methods were adopted, the most conspicuous example of which was the Hudson's Bay Company, founded in 1670.

The long struggle, lasting over a century and a half, between France and England for supremacy in the North American continent was determined largely by geographical conditions. The French on the St. Lawrence, with Quebec and Montreal for their rallying points, and the British on the Hudson, with New York and Boston for their base, were in constant conflict, together with their Indian allies—the Algonkin and the Iroquois, respectively. The peninsular lands between the St. Lawrence and the sea, deeply afforested and peopled with warlike Indians, were the scene of fierce and ruthless encounters. The policy of France was to surround the English maritime settlements, and to join forces with the French settlements in the Mississippi basin—the vast province of Louisiana—but it was a task beyond her strength. The British settlements, north and south of New York, occupied an interior strategic position based on the coast. Thus, access to the interior being blocked, attention was given to agriculture rather than to conquest, New England and Virginia being relatively populous.

At the beginning of the eighteenth century, New York and Quebec —the one on an island, the other on a fortified height: so characteristic of the two peoples—were the keys to the political situation, in which aristocratic and paternal Quebec strove in vain against the democratic and individualistic elements of New York and Boston. Quebec stood at the head of inland navigation (which was interrupted at Montreal by La Chine Rapids) the vast extent of which created an object of rivalry between New England and New France. French settlements, of no great importance, were formed in the maritime provinces (Acadia: *i.e.* Nova Scotia, New Brunswick, and Prince Edward Island); and when Nova Scotia fell to England, by the Treaty of Utrecht, in 1713, the British secured a foothold in New France which led by degrees to its final conquest in 1759, when Quebec surrendered to the heroic Wolfe. Montreal capitulated in the following year; and in 1763, by the Peace of Paris, which ended the Seven Years' War, all the French Possessions in North America became British, although in St. Pierre and Miquelon Isles and on the west coast of Newfoundland French claims survived for nearly a century.

Illustrating Mr Silva White's Article.

NORTH AMERICAN COLONIES, 1755-1763

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NORTH AMERICAN COLONIES, 1755-1763

Twenty years later, the Thirteen Colonies, which had declared their independence of the Mother Country in 1776, became the United States; but they were defeated in their attack upon Quebec. The United Empire Loyalists, however, to the number of 40,000, preferring British rule, migrated in 1784 to Ontario, Nova Scotia, and New Brunswick, settling mainly on the southern shore of the St. Lawrence. Canada was again invaded in 1812, when war broke out between Great Britain and the United States; but the handful of Loyalists and French Canadians repulsed the invaders and held their homes inviolate until the end of the war in 1814. West of Lake Superior—or, more precisely, Lake of the Woods—an artificial frontier, the forty-ninth parallel (created by the Oregon treaty of 1846) separates Canada from the United States; and this frontier is now crossed yearly by a hundred thousand peaceful emigrants from the American Union, who find new homes in the prairie lands.

In 1791, when Upper Canada (now Ontario) and Lower Canada (now Quebec) were formed by Act of Parliament into two provinces, the population of the country numbered about 160,000; and all the colonies had representative institutions. At the close of the eighteenth century, British settlements in Canada—apart from the Hudson Bay traders and Newfoundlanders—were still confined to the Maritime Provinces, the shorelands of the St. Lawrence and of the Great Lakes; while the Prairies to the west were left to the vast herds of bison, or buffalo, and Indian hunters.

After the war between the United States and Great Britain (1812-1814), under the industrial depression and social unrest in the Mother Country which followed her supreme effort at Waterloo, Canada received a steady stream of English and Scottish emigrants, and began to open up the western waterways. The Hudson's Bay Company and the North-West Company, engaged in friendly rivalry, pushed their search for furs farther afield; and, in 1812, the Scottish and Irish settlement on the Red River was founded by Lord Selkirk.

The long-sustained conflict between the executive and legislative authorities and the struggle for supremacy between the French and British elements of the population led to the outbreak of a rebellion, in both Upper and Lower Canada, and, consequently, to the suspension of the constitution of the latter. But the rebels were easily dispersed, and constitutional grievances were redressed by the Act of 1840, which reunited the Provinces. The new Constitution of 1841 did not, however, find full expression until the appointment of Lord Elgin, as Governor-General, in 1847. A few years later, responsible government was granted to the Maritime Provinces. The repeal of the navigation laws in 1849 threw open the St. Lawrence to the merchant shipping of the world.

Canada—and particularly Ontario—developed rapidly in the next quarter-century, greatly improving her internal and external communications. In 1867 she received her *Magna Carta*, in the British North America Act, which united Ontario, Quebec, New Brunswick and Nova Scotia under a Federal Dominion which left room for union with the

other Provinces. The population of the Dominion then numbered about 3,400,000.

West of the Woodland Region, on the wide plains which extend to the foot of the Cordilleras, or Rocky Mountains, settlement lagged behind. The Hudson's Bay Company, which absorbed the North-West Company in 1821, had its principal post at Winnipeg—then called the Red River Settlement—and carried on an extensive trade in furs, little realising the gold-mine that lay in the rich soil of the prairies. In 1869, the Canadian Government acquired, by purchase, the territorial rights of the Company over the North-West Territories: but on attempting to take possession, the half-breeds, who constituted the main population of the Red River Settlement, rebelled, and, under the leadership of Riel, instituted a provisional government. No resistance, however, was offered to the expedition sent out under Sir Garnet Wolseley, which restored order. In 1870, the Red River district received responsible government and was admitted to the Dominion as the Province of Manitoba.

The rapid development of Manitoba and the opening up of the Prairie Provinces—in which, it is estimated, over two hundred million acres are available for cultivation—are unsurpassed achievements in Colonial settlement. To this success the Canadian Pacific Railway, which was opened for traffic in 1886, largely contributed, side by side with the linking up of Ontario and Quebec by the Inter-Colonial Railway. Under a liberal land policy, emigrants poured into the Prairie Provinces; and the flood of migration is still unabated.

Prince Edward Island joined the Federation in 1873. Other unions followed: and before the close of 1905, the Prairie Lands entered the Dominion as the Provinces of Alberta and Saskatchewan.

On the Pacific Coast, with Vancouver as a centre, settlement lagged until discoveries of gold in the Yukon district attracted a large floating population. In 1898, British Columbia was constituted into a separate territory; and its progress since then has been rapid.

The general election of 1911, turning on the question of Reciprocity with the United States, was an epoch-making event, not only for Canada but for the Empire at large. In the words of Mr. Borden, Canada then "determined that for her there shall be no parting of the ways, but that she will continue in the old path of Canadian unity, Canadian manhood, and the British connection: she has emphasised the ties that bind her to the Empire."

With these few landmarks in the history of Canada to guide us, we shall enter upon our survey of the great Dominion.[1] Its past history,

[1] The political history of the country has been divided, by a Canadian historian, into five fairly distinct periods:

1. The period of French rule, from 1608 to 1760, or the régime of absolute government.
2. The period of a Crown Colony from 1760 to 1791, when representative and legislative institutions were established.
3. The period from 1791 to 1840, when representative institutions were slowly developing into responsible or complete self-government.
4. The period from 1840 to 1867, during which responsible government was enjoyed in

Illustrating Mr Silva White's Article.

BRITISH NORTH AMERICA, 1791

which has been signalised by the implanting and cultivation of English traditions, although beginning in conquest by force of arms, illustrates for us the capacity of two great colonising peoples to pursue the arts of peace, side by side, in friendly rivalry and towards a common goal.

Area and Settlement.

The Dominion of Canada covers an area greatly exceeding that of any other portion or political aggregate of the Empire, and, with the exception of the United Kingdom and India, has a larger population: nevertheless, the population of Canada in 1911 was less than that of "Greater London."[1] Compared with the United States, Canada occupies a much larger area—nearly a million square miles—but has only one-thirteenth of its total population. This disparity in numbers is accounted for by the vast extent of Arctic or virtually unprospected lands (covering two-thirds of the total area of Canada) in the Northern Territories and the corresponding absence of natural resources to support a large, and in the main agricultural, population.

Inclusive of the aggregate area (125,755 square miles) of lakes and rivers within the territorial limits of the Dominion, the total area of Canada is 3,729,665 square miles, or over thirty times that of the United Kingdom. Consequently, nearly one-thirteenth of the surface of the Dominion is occupied by water. Nothing could be more fortunate, since the waterways of Canada offer a magnificent—perhaps an unrivalled—system of inter-communication between east and west, along the main line of her natural development. The settlement of this area is, of course, exclusively in the south, contiguous to the coastlands of the Maritime Provinces, the shorelands of the St. Lawrence and Great Lakes, and along the trans-continental, natural and artificial highways. Facility of communication has, in short, largely determined the settlement of Canada, influenced by a general tendency of concentration towards the United States frontier.

Physical Structure.

The physical structure of the North American continent is both simple and massive. The land-masses are carved out on bold lines.

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the fullest sense of the term, and the federal union was finally accomplished as the natural result of the extended liberties of the people.

5. The existing period—the period of confederation—in which the political system has been adapted to the circumstances of the country.—*Canadian Life in Town and Country* (p. 43), by H. J. Morgan and L. J. Burpee.

[1] The population of Registration London (of the "Outer Ring") and of "Greater London" (or the Metropolitan and City Police district) according to the census of 1911, was:—

Registration London,	4,522,961
"Outer Ring,"	2,730,002
"Greater London,"	7,252,963

Statesman's Year Book, 1912.

The catchment-basins of the Atlantic and Pacific drainage-areas are divided on the western side, where the Cordilleras, or Rocky Mountains, run the entire length of the continent. The main chain is accompanied, in various places, by parallel ridges, some of which have distinctive names and throw off spurs in all directions. This continental uplift, uniting somewhat abruptly with the Great Central plain, is drained towards the south and east by the Missouri-Mississippi river-system, towards the north by the Yukon and Mackenzie systems, and to the west by numerous rivers of no great length. The great central area is drained towards Hudson Bay, but its two largest rivers—Mackenzie and St. Lawrence—have separate watersheds. It is separated from the Great Lakes by The Height of Land. The Appalachian Highlands intervene between the catchment-basin of the St. Lawrence system and the Atlantic. The Rocky Mountain system in the west may be said to constitute the terrene of British Columbia, the area of which is nearly three times the size of Great Britain and Ireland.

The drainage-areas of Canada are as follows :—

	Sq. Miles.
Atlantic Basin (exclusive of Hudson Bay),	554,000
Hudson Bay Basin,	1,486,000
Pacific Basin,	387,300
Arctic Basin,	1,290,000

The relative areas of Canadian territory drained by the St. Lawrence Basin are :—

	Sq. Miles.
Above the mouth (Pt. de Monts),	498,500
,, Montreal,	368,900
,, Kingston,	302,300
,, Niagara,	267,100
,, Windsor,	230,500
,, Sault St. Marie,	82,890

The areas of the Great Lakes are :—

	Sq. Miles.
Lake Superior,	31,800
,, Huron,	23,200
,, Erie,	10,000
,, Ontario,	7,260
and	
,, Michigan (in U.S. territory),	22,400

Lake Superior is the largest body of fresh water in the world. Its area is greater than that of Scotland.

The general strike of the country is along the spread of its coastline. The Rocky Mountain system attains its widest expansion in about latitude 40°, between the Great Basin on the west and the High Western Prairie on the east. The Great Plains slope eastwards from the High Western Prairie, and are broadest between latitudes 35° and 55°. The Labrador Peninsula slopes from south to north, the highest

elevations (1000 to 2000 ft.) being in the south and east. There is no natural frontier between Canada and the United States, save those provided by the St. Lawrence system: on the contrary, the Great Lakes unite, and there is a co-mergence of physical structure along the general strike of the country. This physical co-unity is of political significance.

Hudson Bay lies in a cup-shaped depression, with a deep channel outlet (Hudson Strait) to the Atlantic, which is blocked by icefields during the greater part of the year: otherwise it would attract the mercantile marine of the world into the very heart of the Dominion: in other words, climate has condemned this region to sterility. The Hudson Bay basin is built up of Archæan rocks, between the Mackenzie and the St. Lawrence river-systems, surrounded by a zone of Palæozoic rocks. This core, or nucleus, of ancient rock-structure—which occurs again in many mountain ranges in North America—is separated from the Palæozoic and Mesozoic masses of the mountainous western range by broad plains and prairies, which are underlain by more recent formations. The vast ice-sheet, which in the Great Ice Age filled the lowlands of Canada, left behind deposits of boulder clay that cover the underlying formations and impede the more direct flow of the rivers, thus creating shallow and sluggish waterways in the Great North-West which are open to navigation by canoe.

The Appalachian Highlands represent the vestiges of a geologically ancient mountain range, so eroded and denuded that only moderate heights of hard rock remain, the chief of which—White and Black Mountains—lie in New Hampshire and North Carolina. Granite rocks are widely distributed in the Maritime Provinces.

On the other side of the continent, the Rocky Mountain system (Cordilleras), with precipitous slopes and escarpments on its eastern borders, prevails, in a series of ridges, throughout the length of Western Canada—almost everywhere up to the coastline—and it is very varied in structure and form. A high-plateau occupies the central parts. Its general elevation falls within the two-to-five thousand feet contour-line: but there is a well defined backbone carrying elevations of from five-to-ten thousand feet, between which and the Pacific coast there are numerous *enclaves* or *massifs* of the same height. It is a "sea of mountains." There are peaks of from twelve to fourteen thousand feet, the highest (recorded) elevations being reached in Alaska by Mount St. Elias (18,024 ft.) and Mount Logan (19,534 ft.). The Alpine mountains of the Selkirk Range, traversed by the Canadian Pacific Railway, contain many snowfields and glaciers.

Climate.

The North American continent ranges through every category of climate, from sub-tropical to Polar. In the main, the climate is continental in character, being subject to the greatest extremes of seasonal changes of temperature in the broad lands of the north. In the south, the heat-equator (indicated by the mean annual temperature)

carries an isotherm of 70° Fahr. far into the temperate zone. Inter-seasonal changes are gentle on the Pacific Coast, but abrupt in the interior and on the Middle Atlantic border.

The highest mean annual rainfall[1] (from 50 to 75 inches) occurs round the Gulf of Mexico and on the coast of British Columbia, where in places it exceeds 75 inches. The warm Kuro Siwo, or Japanese current, splits between Vancouver Island and Queen Charlotte Island—one arm going north, the other south—thus modifying the climate, which is mild and humid on the coast.

The Rockies and the cold waters of Hudson Bay carry the isotherms for the year further south on either side of Canada. The isotherms for summer show the great northern "loop"—or, penetration into the interior—of the 55 isotherm, which, together with other influences, makes the cultivation of cereals possible, even in the valley of the Mackenzie River. In the northern portion of Canada there is considerably more sunshine in the summer than in the southern: and, owing to the clearness of the skies, the average duration of actual sunshine is greater in northern Canada than in the eastern portion. In consequence of the moderating effect of the Atlantic Ocean and the Great Lakes in eastern Canada and of the Japanese current on the Pacific coast, temperatures at Quebec average 290 days in the year above the freezing point (32°), and at Victoria, B.C., as many as 363 days. The high summer temperature of towns in southern Canada may be indicated by a line passing through Nova Scotia, Ottawa, the extreme southern portion of Alberta and Saskatchewan, along which the temperature is above 50° during 200 days in the year. In south-western Nova Scotia and in eastern Quebec, temperatures exceed 70° on only fifty days in the year. The Ottawa valley, in the vicinity of Ottawa city, has upwards of a hundred days above 70°; and Winnipeg has 70 days or more. These figures are based on observations extending over a series of years.[2]

Following Dr. G. M. Dawson,[3] we may, in general terms, divide the whole country into three climatic areas—the Eastern, the Inland, and the Pacific Coast regions, to which, however, we must add a fourth: the sub-Arctic lands of the Northern Territories. The Eastern region, characterised by great range of temperature and ample rainfall, coincides with the Southern Forest area, which includes all the old provinces, and extends westwards almost to Winnipeg. The Inland region, stretching still further westward to within a short distance of the Pacific Coast, is characterised by a still greater range of temperature—hot in the summer and cold in the winter—but has a moderate rainfall. The Pacific Coast region, with an oceanic climate—small range of temperature, heavy rainfall, and high humidity—does not include the whole of the Pacific slope, but only the coastal zone of the western mountain range of the Cordilleras, which enjoys a climate that is comparable to

[1] Precipitation includes snowfall as well as rainfall—ten inches of snow counting as one inch of rain, on a rough average.

[2] Cf. *Atlas of Canada*: Department of the Interior, 1906.

[3] Mill's *International Geography*, p. 682.

that of England at its best. The exhilarating atmosphere of Canada mitigates seasonal severities; and the four or five months of winter, with its mantle of snow, prepares the land for a rich yield of cereals.

Flora.

The floras of the Maritime Provinces, Quebec and Eastern Ontario, are, generally speaking, much the same; in Western Ontario, trees, shrubs, and herbaceous plants not found in the eastern parts become common. In New Brunswick, the western flora appears in conjunction with some southern immigrants, and in Quebec the flora is very varied. Beyond the forest country of Ontario, in Manitoba and the former North-West Territories, the eastern flora penetrates the ravines, but succumbs to the prairie, which prevails everywhere between the Red River and the Rocky Mountains, except in wooded and damp localities. In Saskatchewan, the flora of the forest and that of the prairie intermingle. The flora of the forest belt of the North-West Territories resembles that of northern Ontario. In the mountainous country of British Columbia, the flora varies in accordance with climatic conditions: in some of the valleys open to the south, it is partly peculiar to the American desert: near the Pacific coast, the woods and open spaces are filled with flowers and shrubs.[1]

Surface Features.

Canada is widely afforested, in deep zones extending from south to north, and most densely in the Cordilleran forest of British Columbia. The southern forest, between Manitoba and the Atlantic, which has been largely cleared in the Maritime Provinces and along the shores of the St. Lawrence, merges into the densely wooded zone of the northern forest in a line drawn irregularly between Winnipeg and the mouth of the St. Lawrence. The great Northern Forest extends in a deep zone right across the continent, getting thinner and thinner as the sub-Arctic lands are approached. Finally, prairie lands extend from Winnipeg to the Rockies, merging in the north, along the settled area, into mixed prairie and woodland country. There are national parks and timber reserves in many parts of the Dominion.

For the purposes of our survey, it will be convenient to divide up the country into the following natural regions:—(1) *The Woodland Region*, covered by the Southern Forest, including the Maritime Provinces, Ontario, and Quebec; (2) *The Prairie Provinces* of Manitoba, Saskatchewan, and Alberta (partially cleared in the south, and opened up to agriculture); (3) *The Sub-Arctic Lands* of the Northern Territories, including Hudson Bay, between Bering Sea and Labrador Coast; and (4) *The Pacific Slope* of British Columbia.

From west to east, bordering the United States frontier, the Cordilleran forest region extends over a distance of 500 miles; the prairie lands, including mixed prairie and woodland, cover a zone at least 800

[1] *Encyclopædia Britannica*, 11th Ed., vol. v., p. 147.

miles in length and from 300 to 400 miles in depth: and the woodlands of the Southern Forest, bordering the 50th parallel, extend over a distance of 1500 miles, to the mouth of the St. Lawrence River. The northern limit of forest approximates to the isotherm of mean summer temperature: 50° F.

THE WOODLAND REGION:

ONTARIO, QUEBEC, NEW BRUNSWICK, PRINCE EDWARD ISLAND, NOVA SCOTIA, CAPE BRETON ISLAND.

Surface Features.—The Woodland Region lies between the Great Lakes and Hudson Bay, and extends into the Maritime Provinces. It is pre-eminently a region of unrivalled inland waterways, in which agriculture and woodcraft vie with mixed farming and mineral production. The most populous and important provinces of Canada and the seat of the Dominion Government are included in its area.

A magnificent system of waterways opens up from the Gulf of St. Lawrence, which carries tide-water for 700 miles—or, from the mouth of the St. Lawrence to Three Rivers, 330 miles inland from the sea—and extends to the head of Lake Superior, at the western extremity of Ontario, over a distance of 2384 miles. Combined with the canals—eight in number, with fifty-four locks—a continuous waterway, nowhere less than 14 ft. deep, is thus provided between Lake Superior and the Atlantic. The canal system begins at La Chine Rapids, above Montreal, which is the first obstruction to free navigation from the sea: and at Montreal—the principal emporium of trade and nodal point of communications—the first railway bridge crosses the river. Montreal is thus the gateway of Canada, from whence railways radiate in all directions.

Above Montreal and La Chine, the St. Lawrence River—still a mighty stream, carrying numerous islands in its bed—connects with the chain of fresh-water Lakes—Ontario, Erie, Huron and Michigan (united on the same level), and Lake Superior—each a little larger and higher as one proceeds from the one to the other. Between Lakes Ontario and Erie, the famous Falls occur on the Niagara River, about half-way: a navigable river connects Lakes Erie and Huron; and between Lakes Superior and Huron the connecting stream is obstructed by the Sault Rapid—or Leap of St. Mary—locally known as the Soo, past which a canal with only one lock carries ships drawing 20 ft. of water.

Navigation on the St. Lawrence to Quebec and Montreal—both ice-bound ports—is usually open from the end of April to the end of November. Above Lake Superior, navigation, with interruptions, may be continued westwards to almost the foot of the Rockies by Rainy Lake and River, Winnipeg Lake and River, and the North Saskatchewan River.

Natural Resources: Minerals.—Mining, although only in its infancy, has become a leading industry of Canada, second only to agriculture. Coal and iron in proximity appear in many parts of the Maritime Provinces; and lignite (brown coal) deposits are found on the southern

border of James Bay (Hudson Bay). Ontario, Nova Scotia, and Quebec are the only provinces of Canada in which at present iron ores are smelted and converted into iron and steel.

Gold is obtained in Nova Scotia from saddle reefs and veins in fissures associated with them. Auriferous veins are found also in eastern Ontario. Other gold districts are the Beuce, near Quebec, and a considerable area of the country between the Lake of the Woods and Lake Superior, which contains also Atikokan and Hunter Is. iron districts. Silver is mined at Thunder Bay, near Port Arthur, where it occurs in the form of the sulphide, argentite; and silver-bearing galena is found also in New Brunswick and Nova Scotia. In 1910, Canada took third rank in the world's production of silver. Copper deposits are widely distributed, the bulk of the production coming from Quebec and Ontario.

Canada supplies the greater portion of the world's output of nickel (chiefly to the United States) from the deposits at Sudbury, Ontario, near Lake Superior: a small proportion of cobalt and traces of platinum are present, in addition to the nickel. Nickel occurs also in the ores of cobalt near Lake Temiskaming, in Huronian rocks. At the present time, too, about 90 per cent. of the world's output of asbestos is derived from the Thetford and Black Lake region of the eastern townships of Quebec, south of the River St. Lawrence, where the mineral is worked in open quarries. Canada supplies over 85 per cent. of the world's total production of corundum, the principal deposits being in Renfrew County; and she has become one of the chief mica producing countries, mainly for electrical purposes.

Graphite of fair quality occurs at Cape Breton and at other localities in Nova Scotia, as well as near St. John, New Brunswick. The deposits which, up to the present, have been worked chiefly are in the crystalline limestones and gneisses of Quebec, north of Ottawa. Gypsum is quarried in large quantities in Nova Scotia and New Brunswick, where it occurs in beds of Carboniferous age: whilst in Ontario it is found in Silurian beds.

The mineral wealth of Ontario is both varied and extensive: there are, perhaps, few regions of the world in which more promising prospects are to be found. Petroleum occurs in large quantities in the Ontario peninsula; but the Province has no coal (apart from the deposits of lignite, referred to) and the development of the mining industry is thereby handicapped.

Of the principal metals and minerals produced by Canada, in 1911, coal took the lead in the value of the year's output; and was followed by silver, nickel, and gold. The coal production of Canada may be divided into four parts:[1] Nova Scotia, British Columbia, and Alberta, in the rank indicated, contributed the bulk of the output, a small residue coming from Saskatchewan, New Brunswick, and Yukon. In Nova Scotia—by far the most important area—coal has been mined for over two centuries. The coals, belonging to the middle measures of the Carboniferous forma-

[1] *Commission of Conservation* (Canada, 1911: Lands, Fisheries and Game. Minerals, p. 433.

tion, are found in several parts of the Province but chiefly at Sydney, where it is easily and economically mined. Practically, all the Nova Scotia coal-fields have the advantage of being on tide-water.

As the coal deposits of Canada are located only in the eastern and western portions of the country—omitting the rapidly growing industry in Alberta and Saskatchewan, where the coal mined is retained for home consumption—it is necessary for Ontario, Quebec and Manitoba to import coal from the United States. Consequently, in many parts of Canada coal has not yet replaced wood as a fuel. Natural gas wells are productive in six of the counties of Ontario—the main source of Canada's supply.

Water-Power.—Water-power is not usually included among the natural resources of a country; but in Canada it is one of special significance, constituting an important national asset. The Hon. Clifford Sifton, chairman of the Conservation Commission, claims that Canada possesses nearly one-half of the total available water-power of the globe.[1] But only a tithe of this has been tapped. The total water-power developed in Canada during 1910 amounted to 1,016,521 h.p., of which the bulk was electrical energy, and the principal industry using it was the paper and pulp mills. Ontario takes the lead in the development of its water resources, the Ottawa river and its tributaries forming a power district of signal importance. The power stations of the Niagara Falls constitutes the most important hydro-electric power site in the world. Quebec, too, is well served: it is calculated that 80 per cent. of the power used in the Province is water-power. The Maritime Provinces, having no large watersheds—although watershed area is by no means correlative with water-power—rely mainly on steam-power for economic requirements. In Manitoba, the largest water-power resources are on the Winnipeg River. In British Columbia, Yukon Territory, and the vast North-West, water-power, though little used so far, is practically unlimited.

Agriculture and Farming.—Although mining is attracting an increasing amount of attention, and some day may rival agriculture, the latter must be regarded as Canada's chief national asset. The resources of agriculture tend to settle and develop the land as no other industry can do. Moreover, these resources create interests that foster the best elements of national life and have an important bearing upon the fortunes of the nation.

Agriculture is the chief industry of the Maritime Provinces, in which soil and climate combine to offer the most favourable productive conditions. The forests have been cleared extensively along the coastal zones, where the fertile soil is capable of supporting a relatively large population, particularly in Prince Edward Island—"the Garden Province of Canada"—the greater portion of which is occupied by farms and lots. Even in Nova Scotia, which has so many varied resources—mines, forests, and fisheries—mixed farming, dairying, and apple-growing are carried on with satisfactory, if somewhat halting, results: the apples of the salt marshlands of Annapolis valley are famous, but only ten per

[1] *Commission of Conservation* (Canada), 1911.

cent. of the land is under orchard cultivation. New Brunswick, larger and less densely populated than the other Maritime Provinces, enjoys every advantage as an agricultural and fruit-growing country, and has a better water-supply. The great majority of the people in New Brunswick are farmers; but stock-raising and dairy farming have been found to be more profitable than grain crops or fruit-growing.

Ontario has large areas with soil and climate suitable for fruit-growing; and practically all the fruits of the temperate zone can be produced in the Province. The centres of the industry are the Niagara Peninsula and the regions round Lake Erie, where the climate is particularly mild, favouring the cultivation of grapes and peaches in addition to hardier fruits. Ontario is said to produce 75 per cent. of all the fruit grown in Canada. In agriculture, too, Ontario enjoys a leading position; but the Province has found dairying more profitable than grain-growing. In particular, the cheese industry—both in Ontario and Quebec—is of great importance to Canada, which exports every year, chiefly to Great Britain, quantities approximating five million pounds sterling in value.

Agriculture, too, is the principal industry of Quebec Province, in which mixed farming generally is carried on by the French-Canadians. The St. Lawrence Plain is well suited for agriculture; and it is fully settled. In addition to the ordinary farm crops of temperate countries, tobacco is grown on a limited scale. Dairy produce and market gardening find a ready market.

The Federal and Provincial Governments foster the dairy industry in various ways. All the provincial departments of agriculture, except that of Nova Scotia, where dairy farming is not so important, have organised dairy divisions. Dairy schools are maintained in Ontario, Quebec, and New Brunswick, as well as in Manitoba. Experts are engaged to visit creameries and factories during the working season in order to give instruction and advice. Usually, Government inspection is carried out; and the commercial interests of the producer are, together with other matters, cared for by the Dairy and Cold Storage Commissioner and Staff.

An important factor in the practical and scientific development of the agricultural resources of Canada has been the invaluable assistance given by the experimental farms. The farms have a large staff of skilled investigators; and experiments are made as to the best methods of preparing the land for crops, maintaining its fertility, and disposing of the produce to the best advantage. The Central Experimental Farm is at Ottawa, which is close to the boundary between Ontario and Quebec. A branch at Nappau, in Nova Scotia, serves the three Maritime Provinces.

Forest Products.—The eastern Provinces were at one time covered with forests, and, in the early days of settlement, lumbering was the principal occupation of the people. It still is one of the most important industries of Canada. The forest area of the Woodlands Region is officially estimated[1] as under:—

[1] *Statesman's Year Book*, 1912, p. 254.

	Thousand Acres.
Quebec,	120,000
Ontario,	40,000
New Brunswick,	7,500
Nova Scotia,	5,500
Total,	173,000

This area is nearly equal to the forest areas of British Columbia and of Manitoba, Saskatchewan, Alberta and Territories. The Crown Forests of the Woodlands Region belong to the Provincial Governments.

In valuable species of timber, the Eastern Forest is the richest in Canada. It contains a monopoly—or what is now left after clearance and forest fires—of the hardwoods, of white and red pine, and rich stocks of spruce, cedar, balsam fir, and larch. But hardwoods are now scarce, and have to be imported in excess of the local supply. The Eastern Forest produces about four-fifths of the lumber cut in Canada.

Maple-sugar is made generally from the hard maple, which is a common tree from Nova Scotia westwards to Lake Superior, and reaches its greatest size in SW. Ontario.

Fisheries.—It is claimed that the Canadian territorial waters contain the principal food-fishes of commerce in greater abundance than the waters of any other part of the world. The value of the catches for 1909-10 ranged between seven and one million dollars—in the order given—for salmon, cod, lobsters, herring, halibut, and haddock. Canadian salmon ranks, nearly commensurately in value, with the export of dried codfish from Newfoundland. As in Newfoundland, the coastlands of the Atlantic Provinces, from the Bay of Fundy to the Straits of Belle Isle, are highly incised and indented; and this coastline, measuring over five thousand miles, contains innumerable natural harbours and coves. Deep-sea fishing is pursued on the banks lying from 20 to 90 miles from the Canadian coast, where cod, haddock, hake, and halibut abound; and the inshore fishery includes these food-fishes as well as herring, mackerel, smelt, flounder and sardine. A most extensive lobster fishery is carried on along this coast; and there are good oyster beds in many parts of the Gulf of St. Lawrence. In the inland lake fisheries, the principal commercial fishes caught are whitefish, trout, pike, sturgeon, and, in the Great Lakes of Ontario, fresh-water herring.[1]

The fisheries of the Gulf of St. Lawrence and the Bay of Fundy are the oldest in Canada, and rank among the great fisheries of the world: cod, mackerel, halibut, salmon and herring are taken in great numbers. The lobster and oyster industries of Prince Edward Island also are of considerable magnitude. According to official returns (1911), Nova Scotia is the leading fish-producing Province of Canada, followed by British Columbia, New Brunswick, Ontario, Quebec, and Prince Edward Island.

[1] *Commission of Conservation* (Canada), 1911: Fisheries and Game.

Game, and Animal Products.[1]—Moose and caribou abound in many parts of the forests of Quebec, while Virginian or red deer have increased, in some parts to an inconvenient extent. The greater part of the country about The Height of Land between Lake Edward and Kiskisink is full of game. Moose, caribou and deer are found in the Ottawa district, where partridges, wild ducks and wild geese abound in their seasons. In the country north of the Ottawa, the moose have been thinned out. On the south side of the St. Lawrence, red deer are plentiful in almost every part of the Eastern Townships where any wild forest lands remain. Almost the whole southern portion of the Province of Quebec, adjacent to the State of Maine—an unsettled wilderness—is full of big game. The caribou have disappeared from Prince Edward Island and from the greater part of the Province of Nova Scotia: on Cape Breton Island they are found in considerable numbers.

The birds of Canada are, for the most part, migratory. Nearly all the sea-birds of the British Isles are found in Canadian waters or are represented by allied species. In the Gulf of St. Lawrence, the gannet is very abundant. There are several varieties of geese and grouse—among the latter, the ruffled grouse, perhaps the most valuable of the game birds—and in certain parts of Ontario the wild turkey is found occasionally. New Brunswick is the best game province, ranking next to British Columbia in that respect; the extent of the hunting ground covers about four-fifths of its area.

Animals and their products come next to agricultural products and manufactures among leading exports from Canada; but we have no statistics to show the relative share of the Woodlands in that respect. Ontario and Quebec, however, possess by far the largest share of live stock (horses, horned cattle, sheep and pigs), of the provinces of Canada.

THE PRAIRIE PROVINCES:

MANITOBA, SASKATCHEWAN, ALBERTA.

Development.—To a large extent, the Prairie Provinces have been carved out of the more or less densely wooded Northern Forest. The treeless prairie is not so dominating as is commonly supposed, except in the settled area.[2] The settled area (prior to the new boundary arrangements) embraced the greater portion of the Provinces of Saskatchewan and Alberta and all Manitoba. The population of Manitoba is now exceeded by that of Saskatchewan, and Alberta is not far behind.

Although Canada is among the important grain-producing regions of the world and cereals are cultivated over a large part of the Dominion, the rapid development of Western Canada during recent

[1] *Commission of Conservation* (Canada), 1911; Fisheries and Game.

[2] Cf. *Atlas of Canada*, by James White (Department of the Interior): Forests—Plate 8.

years has been due in great measure to its natural capacity for the successful production of wheat and oats. The undulating prairie lands, which extend westwards from the Great Lakes to the foot of the Rocky Mountains, embracing Manitoba—the central province of the Dominion—Saskatchewan and Alberta, produce wheat of very high quality, in addition to oats, barley and rye. "It is not unwise to predict," says Mr. W. P. Rutter, in *Wheat Growing in Canada*, "that future wheat exporting on a large scale from America will be with Canada rather than with the United States or even Argentina. No other conclusions are possible than that Canada has greater possibilities of an immediate and rapid increase in wheat production than any other country in America, and that, though it is not possible to gauge all her potentialities as a wheat producer, yet her possible future wheat lands would seem to be greater than those of the United States and Argentina" (p. 292). During the twelve months ended July 1911, Canada exported more wheat than any other country in the world.

Surface Features.—The Prairie Provinces are built up in three steppe-like zones along the eastern flank of the Rocky Mountains, with a general strike corresponding to that of the main axis: north-west and south-east. These zones represent natural areas, in striking contrast to the Provincial boundaries, which partition the country after the manner of town-lots. In general terms, Manitoba may be said to occupy the lowest prairie-steppe (500 to 1000 ft., *s.m.*): Alberta, the highest (2000 to 5000 ft.): and Saskatchewan, the middle region (1000 to 2000 ft.) The northern parts of Alberta and Saskatchewan are drained through the Athabaska and Peace Rivers into Great Slave Lake, from whence the Mackenzie issues in its long course to the Arctic Ocean. The greater portion of the Province of Manitoba lies in the dry bed of a geologically ancient glacial lake, the soil of which—a rich clay, or black lake-silt, for the most part—is the most fertile in the world for growing wheat. The basin is cut up into lake, marsh, and dry land—the marshlands overlying a rock floor of Silurian or Devonian limestone, which protrudes in places. Lake Winnipeg and the other lakes, all inter-communicating, are expanses of shallow water which, while reproducing, *in petto*, some of the features of the Great Lakes, are mere lagoons broken up by marsh-lands. This inter-lake-land, which drains into Hudson Bay by the unnavigable Nelson River, receives on its southern border the waters of the navigable Red River and its affluent, the Assiniboine. The watershed between the Red River and the Lake of the Woods—the last true lake, from east to west—is imperceptible.

The Manitoba escarpment in the west leads up, in steep slopes, to the middle steppe of Prairie-land, which contains hills and deep river valleys, draining into Hudson Bay. The scarp has no rocks, and consists of shale, sand, clay, and marl of the uppermost Secondary Age: the deep blue clays of Cretaceous formations rival in fertility the best lands of Manitoba. The slope westwards is gradual, and wooded in parts, for 350 miles—a region of "limitless prairie," with hills and trees everywhere. The North Saskatchewan River has a permanent river-bed and follows the straightest course of all the meandering streams

of Prairie-land: it is navigable between May and August practically throughout its length, but interrupted by rapids, from the head of the Grand Rapids, near Lake Winnipeg, to Edmonton and beyond.

The uppermost steppe of the High Western Prairie is drier, barer, and more hilly than the other two we have been considering: it resembles, in some degree, the arid lands of the United States; but a strip between the dry tract and the Rockies receives the warm Chinook winds from the Pacific. Between the dry tract and the rolling prairies of the Peace River district, the prairie land is interrupted by swampy forests round the head-waters of the Athabaska. The Peace and Athabaska Rivers flow northwards into the Mackenzie; and the North and South Saskatchewan drain east into Lake Winnipeg, watering prairie lands that have confused watersheds.

Valuable power sites are located on the Athabaska and Peace Rivers.

Natural Resources: Minerals.—Coal is found in many parts of the third steppe country: natural gas is tapped from Devonian formations: oil occurs in the north and in the south; bitumen is found in the Athabaska districts; salt-springs are worked on the south-west shores of Lake Winnipegosis and at Swan Lake. Coal and lignitic coal are the principal economic minerals found in this great central plain.

The wealth of Manitoba lies in its soil. Minerals are not worked to any extent, at present. Iron ore occurs: and some gold-bearing Huronian rocks have been located on the east shore of Lake of the Woods. The Alberta Coal District—the most extensive in Canada—is estimated to cover an area of nearly twenty thousand square miles; and there is a lignite-yielding area in Manitoba.

Fisheries.—The fisheries of Manitoba are important: those of Saskatchewan and Alberta, relatively insignificant. The principal catches are whitefish, pickerel, and pike.

Agriculture and Ranching.—The Prairie Provinces have a total area of three hundred and seventy million acres, of which over twelve million are water.[1] While all are fertile, the best lands carry soils very rich in the constituents of plant-food. Wheat of the finest quality is raised on the prairie lands of Manitoba and Saskatchewan. Alberta, with a milder winter climate, is devoted chiefly to horse and cattle ranching. Manitoba—the earliest of the Prairie Provinces to be settled—is passing through a stage of transition from wheat-growing to mixed farming.

The total wheat acreage of the Prairie Provinces, in 1911, was over ten million acres—Alberta having five million and Manitoba only three. In Saskatchewan, the wheat yield (over a million and a half acres, in 1911) has decreased. In oats, too—the next most valuable crop—Alberta leads the way, and Saskatchewan has a large share. Barley and flax also are valuable crops, the latter coming mainly from Alberta. In Alberta, dry-farming is practised, and agriculture is keeping pace with the development of communications.

There is ample room for extension in the cultivation of wheat and

[1] This estimate does not cover the new provincial boundaries. *Vide*, p. 546.

the manufacture and exportation of flour in the Prairie Provinces. Canadian wheats and flour command the highest prices in the markets.

Cordilleran Belt.

A strip of territory in the south-western portion of Alberta abuts on the eastern watershed of the Rocky Mountains. Near the height-of-land between Alberta and British Columbia, many peaks rise from 10,000 feet to 12,000 feet above sea-level, Mount Robson being 13,700 feet. The outer ranges in Alberta have steep cliffs towards the north-east; along the dip of the beds, towards the south-west, the slopes are gentler.

Pacific Slope.

Physical Features.—Proceeding on our survey from east to west, we may enter British Columbia from Alberta by several gateways: among others, by the Yellowhead Pass, which lies 3738 feet above sea-level, or by the still higher passes—the Athabaska, the Kicking Horse, or the Crow's Nest. The watershed is confused, giving rise on the steep western slopes, to tortuous river-beds. West of the Rockies, high mountains, divided by deep valleys, prevail in five or more ranges running parallel to the coastline, each of which is distinguished by its physical features and mineral yield.

The coast ranges in most parts do not exceed an elevation of 9000 ft.; but mountains everywhere—a "sea of mountains"—bar the way to freedom of intercourse between east and west. Our view of British Columbia, therefore, may best be taken from the Pacific, to which the Province belongs climatically and structurally.

The great rivers are navigable—except, of course, in the gorges—throughout their course. The Columbia and the Fraser—the chief rivers of British Columbia—take their rise in the longest and most characteristic valley of the Province, which extends north-west and south-east for 800 miles, and gives rise to other rivers.

The Fraser River, unlike the Columbia, flows throughout in Canadian territory, and, bursting slantwise through the Coast range, its waters, reinforced by the Thompsons, reach the ocean near New Westminster. Five hundred miles further north-west, the Skeena breaks through the coast range on its course to the sea. From the mouth of the Skeena, nearly opposite Queen Charlotte Islands, proceeding northwards for forty miles, the only other large river of Canada to reach the sea is the Nass, which empties itself into a fiord, from which the Portland Canal, separating Dominion territory from Alaska, is reached.

Four hundred miles of United States territory constitute a barrier between British Columbia and the Pacific, in the fiords that extend north-westward to Yukon territory. The United States, therefore, holds the main entrance to the mineral district of the Yukon, which is entered by way of Lynn Canal and the White Pass. There are other entrances in Canadian territory, but not of equal value: and the White Pass, leading to Bennett, in British Columbia, is commonly used.

All the main river-valleys of British Columbia rise, tier above tier, in terraces; and these are afforested by equally characteristic trees, marking off this province as distinct from the remainder of Canada: the giant Douglas fir and the great girth of the red cedar are well-known features. Resembling these, respectively, are the white spruce and yellow cedar. Trees 300 ft. high are common.

The Cordilleran forest region is a zone, densely wooded, four hundred miles deep in the southern part, which narrows and thins out as more northerly latitudes are reached, until the sea is touched near Mount St. Elias.

Owing to the general configuration of the country, by which the coastal ranges intercept the rain-bearing winds of the Pacific, dry and wet strips of land are another characteristic of the Province. Farms are found as high as 2500 ft., and cattle graze up to another thousand feet, above sea-level.

Natural Resources.—The natural resources of British Columbia are diverse in character and almost limitless in extent. They comprise fisheries, mines, lumber, agricultural and fruit lands.

Minerals.—The production of various metals in the Province shows progressive growth during the last two decades, except for the years 1902-4 and 1908-9, in which there was a decrease of output. In this production gold (placer and lode) ranks first, followed by coal (including coke), copper, silver and lead. Although, in respect of these minerals, the Cordilleran belt is recognised as one of the great mining regions of the world, the total mineral output of British Columbia is still at an early stage of economic development; but the gold production of Canada comes largely from Yukon and British Columbia. Since the discovery of the rich placers in 1897, Yukon has produced over 13$\frac{1}{2}$ million dollars' worth of gold, and its yield is increasing. The known resources of placer gold in the Klondyke alone have been estimated at a hundred million dollars.[1]

British Columbia and Ontario are practically the only Provinces of Canada producing silver, but of this output the share of British Columbia is only ten per cent., the remainder being derived from the cobalt-silver ores of Cobalt, Ontario.

At present, the reserves of copper ore in Canada are greater than that of any other metallic mineral, excepting iron; and British Columbia contains at least three copper districts of importance: the Rossland, Boundary, and Coast districts. The copper is produced from sulphide ores containing gold and silver; and only part of the production is consumed in Canada.

The production of lead in the Dominion is obtained almost entirely from the Province of British Columbia, chiefly (since 1908) from Fort Steele Mining Division.

The Pacific Coast and the Western Mountains Division, containing the semi-anthracite and bituminous coal-fields of Vancouver Island, at

[1] *Commission of Conservation* (Canada): Minerals, p. 409. The Report furnishes us with material under this sub-section.

Nanaimo and Comox, the bituminous coal-fields of the interior, and the lignites of Yukon are important assets in the coal resources of the Dominion. The coal-fields of British Columbia are situated in the Eastern Rocky Mountain area, the Southern Interior basin, the Northern Interior basin, and the Coast District. The formations in the areas known to contain coal are the Cretaceous and the Tertiary: no rocks of Carboniferous age have been found, so far, to be coal-bearing. The series of mineral fuels range from excellent anthracites to lignites. Whereas in Alberta, with its rich coal-field, coal exclusively is used on the farms, about eighty-five per cent. of the fuel used on the farms of British Columbia is, of course, wood, of which the Province should have an inexhaustible supply, if adequately conserved.

Coal has been for many years one of the chief items in the natural wealth of British Columbia, and the importance of its extensive coal-fields, even in a country otherwise so rich in minerals, cannot be over-estimated. When located close to mining centres, as at Crow's Nest, the beds are of still greater importance, for smelting and other purposes.

Agriculture.—In spite of the total absence of prairie lands, British Columbia, with its multiplicity of land-forms and with every variety of climate, enjoys many advantages for mixed farming and fruit culture. Agriculture is restricted to the coastal plains, the valley bottoms, and the inland plateau. The whole of the province, south of latitude 52°, and east of the Coast Range, is a grazing country up to 3500 ft., and, where irrigation is possible, a farming country up to 2500 ft.

Vancouver Island, with its genial oceanic climate, took the lead in agriculture and fruit-growing, in the early days, when farming settlements were established in the Saanich Peninsula; and its orchards and homesteads now are comparable to those of Kent and Devonshire. Nanaimo, in addition to its coal resources, has good garden-land. The coastal plains are so heavily wooded that clearing is a costly preparation to the laying-out of farms; but good lands in the valleys of the Thompson and Fraser Rivers have been for a long time under settlement, especially round New Westminster and in the Lower Fraser valley. The most extensive farms and the largest cattle ranches are found in the Okanagan valley; and the Kootenay district, opened up by the C. P. R., contains excellent farming and ranching lands. Oats are the principal grain crop.

Food products for the mining population and fruit-growing, partly for export, are growing industries. Hogs, in small farming, are the most profitable of live stock.

Forests.—The vast extent of forest and woodland in British Columbia, covering an area of over 182 million acres, represents one of its chief natural resources. The coast is heavily timbered as far north as Alaska. The most valuable and widely distributed tree is the Douglas fir (Oregon pine), which grows as far north as latitude 55°, where it is supplanted by the cypress, or yellow cedar, red cedar, hemlock, and spruce. Firs—the staple of commerce, owing to their durability and strength—are widely distributed, from the coast to the Rocky Mountains; the best average trees are 150 ft. high, and measure

5 to 6 ft. in diameter. The bulk of this timber is found on Vancouver Island, on the coast, and in the Selkirk and Gold Mountains. The red and yellow cedars also are of marketable value on account of their straight grain and fine growth. Red cedar shingles are the standard in the markets of Eastern Canada; and there are many other trees of commerce which are manufactured into lumber, including white pine, tamarac, balsam, yew, maple, and cottonwood.

The province is unsurpassed as a field for the manufacture of paper-pulp and paper.

Game.—The greater portion of British Columbia being unsettled, and to some extent unexplored, game abounds everywhere. Moose show no sign of decrease—rather the reverse. Deer and bear are killed even close to Vancouver. Excepting antelope and musk ox, British Columbia possesses every species of big game indigenous to North America, even the rarest. In addition to wild fowl and game birds—some acclimatised—there is the finest trout and salmon fishing to attract the sportsman.

The best game district is Cassiar, the least accessible of all. The game to be obtained there includes Stone's mountain sheep (*Ovis Stonei*), and mountain goats are found everywhere in abundance. Black and grizzly bear also are to be found, while caribou and moose are plentiful. There still are some wapiti left on Vancouver Island.

Other good hunting districts are Savona, for wildfowl shooting: Bridge River and Chilcotin, for *Ovis Montana* and other game; East Kootenay, for the greatest variety of sport; West Kootenay and Kamloops, for fishing. The big-horn mountain sheep (*Ovis Canadensis*) reaches its highest development in the Rockies, and still is plentiful in south-east Kootenay.

Fisheries.—The coastline of British Columbia, extending from the 49th to the 55th parallel, between United States territory, is estimated to measure over 7000 miles, exclusive of Vancouver and Queen Charlotte Islands. Being highly indented and fringed with islets, the Pacific Coast offer a very favourable ground for inshore fisheries. The principal take is salmon, which are very plentiful at the mouths of the rivers Fraser and Skeena during the spawning season; and salmon canning is one of the leading industries of the Province.

According to the 45th *Annual Report* (1911-12) of the Department of Marine and Fisheries, British Columbia contributed by far the leading share (13 out of 34 parts) of the total yield of Canadian Fisheries, the bulk of which was salmon, herring and halibut ranking next in value. This was a record year. The salmon are of five varieties—sockeye, spring or tyee, cohoe, humpback, and dog.

Whales are fairly plentiful along the coast and in Bering Sea. Seals are decreasing, and sealing has fallen off since the Bering Sea Award, which imposed restrictions on their catch. The average number for five years, ended 1903, was 26,300 skins, as compared with an average of 62,000 for the previous five-year period. The headquarters of the sealing industry are at Victoria.

From this brief description, but more particularly if we consider

economic conditions, it will be seen that British Columbia is essentially a Pacific State, whose interests "lie on the water": interests that will be affected profoundly by the opening of the Panama Canal. Its mines, its forests, its fisheries are all served best from the ocean, though it may continue to import some of its supplies through the back doors, so to speak, of the mountain passes.

Yukon Territory.

The territory of Yukon, between the frontiers of Alaska and the watershed of the Mackenzie River, is conterminous with the provincial boundary of British Columbia along the 60th parallel. It contains the gold districts of Klondyke and Kluane, and abuts on that of Atlin, B.C.

The physical features of the country approximate to those already given in respect of the Rocky Mountains, of which Yukon Territory is an extension, but the ranges are less distinct and regular. Nearly all the rivers are tributaries of the Yukon, which is navigable by river-steamers from Teslin Lake—one of its sources—to Bering Sea, a distance of 2400 miles. Except in the northern tundra, the lowlands are wooded—in parts covered only by poor scrub—and hardy crops can be raised.

Yukon Territory is essentially a mining country, somewhat inaccessible. In spite of its northern lands being situated within the Arctic circle, the climate is less severe than that of the North-West Territories, in consequence of the prevalent westerly winds. Most of its area falls within the Pacific basin, to which it naturally belongs.

Northern Territories.

The recent re-arrangement of Provincial frontiers under which Quebec, Ontario, and Manitoba reach the shores of Hudson Bay— Quebec absorbing Ungava, Ontario and Manitoba dividing Keewatin, up to the 60th parallel—leaves only the Mackenzie district to represent the North-West Territories, between the Yukon and Hudson Bay. But the barren and unprospected lands of Canada, whatever value they may be found to have in the future, are now better grouped under the title of Northern Territories, in order to convey a clear meaning in Regional Geography. The term "North-West Territories," as employed in the past, marked simply a point of view—that of the seat of Government at Ottawa. Thus, the Prairie Provinces originally were called North-West Territories—with Provincial capitals, first at Winnipeg, then at Regina; and, as the districts became organised and opened up to settlement they took on distinctive names. This will happen again; but, in the meantime, ignoring the expansion of Provincial frontiers, since we are restricting our survey to natural regions, we may return to the *status quo ante* in our geographical survey.

The Northern Territories comprise the unsettled lands of Canada, not previously surveyed by us, merging into the tundra and frozen wastes

of the High North which, commonly coloured red on British maps, make so imposing a display of territory on Mercator's projection. These lands may well be styled Arctic Canada. Annexed to the Crown by an Imperial Order in Council, in 1880, and then transferred to the Dominion Parliament for purposes of administration, they are visited periodically by the North-West Mounted Police, who collect dues at specified posts.

The most striking feature in the structure of this region is the Archæan protaxis covering about two million square miles of territory. It includes Labrador, Ungava and most of Quebec in the east, Northern Ontario in the south, and the Great Central Plain in the west extending from the Lake of the Woods north-westwards to the Arctic Ocean, near the mouth of the Mackenzie River. Most of this vast basin is made up of barren Laurentian gneiss and granite, and it bears evidence of glaciation (*roches moutonnées*). Woodlands occur south of the 60th parallel, in scattered clumps of black spruce, white spruce, and with larch growing in the swampy tracts. North of this parallel, the country is almost treeless or only lightly timbered, with short grasses and sedges covering the undulating, stony plain. The timber line is reached near Churchill, on the west shore of Hudson Bay, but it does not extend so high north in Labrador. To the north of this are the "barren grounds," overrun by caribou and musk ox.

Except on the Atlantic border—in Labrador, where summits of the Nachvak Mountains are said to attain 6000 ft. in elevation—the plateau is covered with hills of uniform level; while the lowlands round Hudson Bay—the Northern Plain—extend to a great distance outwards. The northern parts of Alberta, Saskatchewan, and, to some extent, British Columbia, are drained by the Athabaska and Peace Rivers into Lake Athabaska, out of which the Slave River drains into Great Slave Lake—the main source of the Mackenzie River. From the head of the Peace River to the Arctic Ocean, the Mackenzie River is over two thousand miles in length, half of which is navigable by stern-wheel steamers.

Arctic Canada, except for a few fur-traders, is inhabited only by Indians and Eskimo. The winters are long and severe: but in the autumn, after a short spell of warm weather, the "Indian summer," with a bracing and exhilarating atmosphere, is said to be delightful. Hudson Strait is blocked with ice during eight or nine months in the year, when the North-West Passages all but preclude navigation: thus, the magnificent open waters of Hudson Bay, penetrating deep into British North America, are to some extent a *mare clausum*. Nevertheless a railway to Port Nelson is now under construction.

Northern Canada has been styled "the last great fur reserve of the world." The management of the fur trade is in the hands chiefly of the Hudson's Bay Company, whose posts are widely distributed throughout the Northern Territories. The principal skins brought in by the trappers are musquash, marten, mink, beaver, lynx, ermine, red and white fox. The most valuable fur is the silver fox, of which relatively few skins are taken.

(*Part II., "The People," to follow.*)

GEOGRAPHICAL NOTES.

Europe.

Discovery of Oil-shale in Skye.—It is announced that the Geological Survey officers have discovered a seam of oil-shale, 11 feet in thickness, in the island of Skye, the seam extending over a considerable distance. The shale is not of such good quality as those worked in the Lothians, but it is believed it will prove of sufficient value to be worked commercially.

Africa.

The Algerian Sahara.—We have published here at various times illustrated accounts of the investigations carried on at the Desert Laboratory at Tucson, Arizona, and it is interesting to note that a member of the staff of that laboratory, Dr. W. A. Cannon, contributes to the July issue of the *Bulletin* of the American Geographical Society an article on his travels in the Algerian Sahara. The article is illustrated by a fine series of photographs, and the incidental comparisons with conditions in Arizona are of much interest. Dr. Cannon includes in his paper a good many notes on the vegetation, and lays especial stress on the association in the Sahara of the jujube-tree (Zizyphus) with an unnamed species of Pistacia. He explains the association as due not only to adaptation to similar conditions of life, but also to a protective effect of the jujube on the young Pistacia plants. The jujube has small leathery leaves and spines and is not attacked by grazing animals; the Pistacia, with more abundant foliage, is greedily devoured by such animals. According to Dr. Cannon the Pistacia seedlings are only able to survive if the seed sprouts within reach of the branches of a jujube bush, whose spines protect the young plants until the crowns are high enough to be beyond the reach of the herbivores. Elsewhere, however, he notes that the small shrub Haloxylon, one of the Chenopodiaceae, is eaten by sheep, goats, and camels as well as by the wild gazelle, and is yet abundant and widespread in the desert. We are disposed to ask, if the Haloxylon can survive without special protection, why not the Pistacia?

Dr. Cannon states that he has noticed as a curious paradox that the intensely arid regions of the desert, when the soil is thin, have more plants to the square yard than slightly less arid areas with deeper soil. He explains this by stating that in the latter area the plants are larger and better developed, and thus each individual plant makes greater demands upon the water supply, and so prevents the growth of other plants near at hand. On the other hand, the plants in arid areas with shallow soils are so dwarfed and stunted that each plant requires less water, and thus sterilises, as it were, a smaller area around it. The areas with deep soil have, however, a flora richer in species than those with shallow soil.

General.

Australian Meeting of the British Association.—According to an article in *Nature*, in addition to the various excursions which are being arranged in connection with the meetings in the different capital cities of Australia during the visit of the British Association in 1914, two or more special excursions are being planned with the object of permitting selected members to see parts of the continent which will not otherwise be touched.

The first of these special excursions is to be in Western Australia, and is to be for a party of twenty-five to thirty geologists, zoologists, anthropologists and botanists. The Government of Western Australia and the committee in charge are prepared to arrange for railway facilities and hospitality for a period of from a week to a fortnight, and the regions to be visited lie in various directions from Perth.

The second tour would begin after the last meeting in Brisbane, and would be limited to four to five persons, selected as representative. The tour would give fine opportunities for the study of botany, geology and agriculture, and especially of the questions connected with the possibility of white settlement in the tropics. The trip would occupy about one month, and expenses would be defrayed by the Government of Queensland and the Administration of the Northern Territory.

The proposed itinerary of this tour is as follows:—Brisbane *viâ* Rockhampton to Longreach by rail, coach to Winton, rail to Hughenden and Cloncurry, motor to Croydon, and rail to Normanton. The party would then be taken to the mouth of the Norman river, and be met by the steamer belonging to the Administration of the Northern Territory, and conveyed across the Gulf of Carpentaria, and about one hundred miles up the Roper river. They would proceed through the territory by motor-car (there are no roads) to Pine Creek, thence by rail to Port Darwin, where the steamer for Colombo would be met.

"Freezing Caverns."—Those who take an interest in the bypaths of physical geography are probably acquainted with the phenomenon of "freezing caves." These are cavities and passages which contain ice in summer, though the temperature of the surrounding region is far above freezing-point. Such cavities are not very uncommon in limestone districts, and a controversy has always existed as to whether the ice is actually formed in summer, or whether that found at this season is merely a remnant of a previous accumulation. In a recent article in the *Popular Science Monthly* Mr. M. O. Andrews gives a very interesting account of an "Ice-mine" in the Sweden valley in Pennsylvania, and supports strongly the theory that the ice forms in summer. According to him there is an indraught of cold air into the "mine" in winter, with the result that very cold air is stored in the fissures at the bottom of the pit. In summer, on the other hand, especially on hot days, there is an updraught from the cavern to the free air, and the rising air is cold enough to freeze percolating water, and thus form deposits of ice on the

sides of the pit. So long as the supply of cold air within the fissures lasts this effect continues.

In an article in *Science* Mr. Arthur Miller vigorously attacks Mr. Andrews' views. Apparently he accepts the general outline of the explanation offered for ice-caves in general, but he denies that the formation of new ice goes on in summer, though it may continue after the external air has risen above freezing-point.

Commercial Geography.

Cotton-Growing in the Sudan.—We noted here (p. 157) the announcement that the British Government have guaranteed to pay the interest on a loan to be raised by the Government of the Sudan to the extent of £3,000,000, the money to be used for irrigation and other schemes for the promotion of cotton-growing. A recent issue of the *Bulletin* of the Imperial Institute gives some account of the existing position of affairs in regard to cotton-growing in the Sudan.

At present the chief areas where cotton is cultivated are the Tokar district of the Red Sea province, parts of the Kassala province, and of the Gezira plain, and along the Nile between Khartum and the Atbara river, principally in Berber province. Only in the last region is irrigation meantime practised systematically. As, however, it is proposed to use a part of the loan mentioned above for irrigation works in the Gezira plain, experiments on a large scale are now being carried on there. At present considerable amounts of rain-grown cotton are produced in this region in good years, but the uncertainty of the precipitation causes great fluctuation in the amount produced. In the Tokar district cotton is grown on land flooded by the annual overflow of the Baraka river. Until recently the cotton produced here was of poor quality, but under Government supervision an improvement is taking place. In the Berber province the yield is poor and the industry is not very thriving, while the Kassala yield is mostly used locally or sent to Abyssinia.

The following figures indicate both the fluctuations in the total yield and the progress which is being made. Total export of cotton, ginned and unginned, from the Sudan from 1908-1911 inclusive :—

	Weight.	Value.
1908, . . .	3477 tons	£82,762.
1909, . . .	2481 „	57,707.
1910, . . .	6893 „	230,551.
1911, . . .	5141 „	241,988.

In first nine months of 1912 there was a very large decrease both in weight and value as compared with the corresponding months of 1911, owing to a shortage in the amount of rain and flood-grown cotton, but the complete figures are not yet available. The figures given show, however, that the industry cannot be regarded as stable when climatic variations produce so marked an effect, and suggest that the future in the Sudan must lie with cotton grown on irrigated land.

Tobacco-Growing in England.—One of the crops which the visitor from North America or the continent of Europe misses in Great Britain is the tobacco plant. Attempts are now, however, being made to cultivate this plant in England, and small experiments are also being carried on in Scotland and Wales. Ireland has now a considerable area (about 150 acres) under tobacco. In England experiments are being carried on at Byfleet in Surrey on a sandy soil, with shelter belts of artichokes; at Fleet in Hampshire, on hop land consisting of a silty loam; at Methvold in Norfolk and at Elveden Hall, Suffolk, as well as in Lincolnshire and Worcestershire. The Hampshire experiment is being carried on on the largest scale, and here a large curing barn has been built. In Norfolk tobacco is being grown on small holdings in patches, and the crop is stated to look well. The experiments are being carried out by the Tobacco Growers' Society with the aid of advances from the Development Commission, and under the supervision of an expert from Rothamstead, and it is intended that they should be continued for a period of five years.

Railways in Nigeria.—The construction of a new railway line in Nigeria has been sanctioned by the Imperial Government, and the line will be started without delay, and pushed forward as rapidly as possible.

The terminal point of the line, which will be some 400 miles in length and will probably take three years to construct, has been fixed at the head of the Bonny estuary, and will be called Port Harcourt. From Port Harcourt the line, which is called the New Eastern Railway, will run through the Central Province, traversing a rich and populous district, to the coalfields near Udi, a distance of about 120 miles. Thence it will run to the Benue River, crossing that stream by means of an important bridge a little below Abinsi. It will next run to the neighbourhood of Jemaa, on the tin-fields (to which a branch line may be subsequently constructed), and thence to the point at which the existing line crosses the Kaduna River. There a junction with the Kano-Lagos-Baro system will be effected. The bar at Bonny is said to be the best in British West Africa, affording a depth of 23 ft. at high water, and any vessel that can enter the Bonny estuary can reach Port Harcourt.

Polar.

British Expedition to King Edward's Land.—It is announced that Mr. J. Foster Stackhouse, F.R.G.S., F.R.S.G.S., who was associated with Captain Scott in organising the voyage of the *Terra Nova*, is arranging an expedition to King Edward the Seventh's Land.

It is proposed that the members of the expedition sail from the Thames about the middle of August 1914, in the steam yacht *Polaris*, a ship especially built for ice navigation in accordance with designs approved by an international committee of explorers, including Charcot, de Gerlache, and Nansen. Captain Scott saw the plans of construction and made suggestions concerning them. The *Polaris* was built at

Sandefjord, in Norway, and her trial trips have been quite satisfactory. The expedition will, it is expected, be away for twenty months or more.

EDUCATIONAL.

The Teaching of Plant Geography.—Mr. N. Miller Johnson sends us the following note on this subject:—"There are many books dealing with Plant Geography; there are few treating the subject from an educational point of view. Of these latter may be mentioned the section on this subject in *An Introduction to Practical Geography*,[1] and a more recent book by Dr. Hardy.[2] In addition to these may be mentioned various exercises which occur here and there in the ordinary geographical text-books.

"It appears to the present writer that in the case of older pupils who have already done some Elementary Botanical Nature Study a course in Plant Geography would give definiteness to nature knowledge, especially in those schools where microscopic work is almost an impossibility. The object of the present paper is to make suggestions for such a course. The suggestions, if they have no other merit, have been actually carried out, and are therefore based upon actual experience:—

"I. The effect of warmth, light, and moisture on plant life. Recapitulation of former experimental work, together with outdoor observations. The influence of altitude. A study of vegetation survey work (see papers by Dr. W. G. Smith and others).[3] Alpine plants.

"II. The distribution of cereals considered as a question of climatic control. The preparation of maps (see Economic Atlas).[4] Wheat and oats in Great Britain.[5] Examination of Map of British Isles, showing average annual rainfall, highest summer and lowest winter temperatures. Correlation of distribution with these factors. Preparation of diagrams respecting comparative areas under oats, wheat, turnips, etc.

"III. Soil and Flora. A study of the climate of the home district. A comparison of rainfall, temperature, etc., with other parts of Scotland. A study of tables correlating vegetation zone, altitude, and rainfall.[3] A study of the geological formation of the home district. Classification of plants according to water supply. Xerophytes, Mesophytes, Hydrophytes. The occurrence of different plants on sharply defined areas, such as peat moor, sand dune, deciduous wood, etc. Plant associations.

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[1] Simmons, A. T., and Richardson, H.—*An Introduction to Practical Geography.* Macmillan, 1906.

[2] Hardy, M. E.—*An Introduction to Plant Geography.* Oxford: At the Clarendon Press, 1913.

[3] Smith, R., and Smith, W. G.—"Botanical Survey of Scotland." *Scot. Geog. Mag.*, 1900, 1904, 1905.

[4] Bartholomew, J. G.—*Economic Atlas.* Introduction by Lyde. Oxford: At the Clarendon Press, 1911.

[5] Bridges, J. S., and Dicks, A. J.—*Plant Study in School, Field, and Garden.* Ralph, Holland and Co., 1908.

"IV. Botanical Mapping. The mapping of dominant plant associations in fields, woodlands, etc. Correlation of distribution, with amount of humus, water content, kind of soil, etc. Mapping in colours of distribution of crops on 6-inch ordnance survey map of home district. The effect of geological and climatic conditions upon this distribution. The connection between the vegetation of a district and the occupations of the people.

"V. General survey of main plant landscapes of the world. Selvas, mangroves, savanas, deserts, tundra, mountains, etc."

NEW BOOKS.

EUROPE.

Adventures in the Alps. By ARCHIBALD CAMPBELL KNOWLES, author of "Jocelyn Vernon," etc. Illustrated. London: Skeffington and Co., 1913. *Price 3s. 6d. net.*

The title of this book is misleading, for the only "adventure" we have been able to find is that of being caught on the Gemmi path in a summer thunderstorm, while the author shows little knowledge of the mountains and glaciers usually connoted with most people by the term "Alps." But if there are few adventures there are many "reflections" on Alpine and other subjects.

The Highways and Byways of England: Their History and Romance. By T. W. WILKINSON. London: Iliffe and Sons, Limited, 1913. *Price 4s. 6d. net.*

This is not a volume of the well-known green-covered series, but deals with the highways of England as a whole.

Many roads date from the time when the country was one-third forest, and the remainder largely swamp. Naturally roads, like cultivation, kept to the higher levels, since the low ground was impracticable. Pack-horse traffic settled the lines of some routes, while others owe their origin to the turnpike system—in which this country was unique. Adam Smith and authorities of his era attribute our trade pre-eminence partly to the superiority of our means of communication—and probably with justice. But the motorist of to-day sees no benefit in having to follow a route originally designed to save pack-horses from the danger of being lost in bogs. Hence the Development Act is due quite as much to the hoary antiquity of our roads as to the invention of the motor.

The book is full of interesting lore, but why is there no index? The wanderer, say, in Hampshire or in Yorkshire, wishes to know whether there is anything in it about his particular district, and failing references to information will probably leave the book alone. This is the more to be regretted as Mr. Wilkinson is a real authority on his subject, and has presented here not only a history of the development of the national highways, but much local information of value. There are excellent illustrations.

Athènes. Par GUSTAVE FOUGÈRES. ("Les Villes d'Art Célèbres.") Paris: H. Laurens, 1912.

This is a beautifully illustrated book, giving a full account of ancient and modern Athens, with some description of the interesting sites and monuments

in the vicinity of the town. Two introductory chapters describe, the one the scenery of Attica, and the other, in brief outline, its history. There is a short bibliography and an index. The author is full of enthusiasm for his subject, and the book may be cordially recommended to those who contemplate a visit to the "place where perfection exists," or who have already seen its splendours.

Travels in the Pyrenees, including Andorra and the Coast from Barcelona to Carcassonne. By V. C. Scott O'Connor. London: John Long, 1913. *Price* 10*s.* 6*d. net.*

To those who echo Kipling's line, "France beloved of every soul that loves or serves its kind," this volume will be welcome. It is devoted to the Eastern Pyrenees, a tract of country which has not been so long known to the British traveller as the Atlantic Pyrenees from St. Jean de Luz to Luchon. First of all we have that fascinating mountain eyry, Andorra, a republic "which has dexterously preserved its existence for a thousand years by dividing its allegiance between France and Spain." Then we have what the author styles "Vernet of the English," with the Canigou, regarding whose charms Kipling wrote a glowing letter, while at Vernet Lord Roberts laid the foundation stone of an English Church. Then follow the Abbey of St. Martin du Canigou, Villefranche, Perpignan, and Gerona, the starting-place for Barcelona, where, "if anywhere in Spain, resides the spirit of modernity, the faculty of organisation, the power of accumulating wealth by trade." The volume closes with a chapter on Carcassonne, whose ancient Cité is perhaps the most unique of all the sights of France, while historically none can be more interesting, for this magnificent natural stronghold was held successively by the Gaul, the Roman, the Visigoth, the Spaniard, the Moslem, and the Frank. The author might have dwelt more fully on the exquisite Cathedral of Saint Nazaire at Carcassonne, but as his book relates chiefly to the Pyrenees, Carcassonne can be regarded as only a distant excursion made more easily from Toulouse. The volume contains 4 plates, 158 other illustrations, and a sketch-map of the Eastern Pyrenees.

The Battlefields of Scotland: Their Legend and Story. By T. C. F. Brotchie, F.S.A.Scot. Illustrated. Edinburgh: T. C. and E. C. Jack, 1913. *Price* 5*s. net.*

Mr. Brotchie has connected his "Battlefields" with explanations of the causes which led up to them, so that his book becomes in effect a sketch of the history of Scotland in which prominence is given to the episodes of war. He makes good use of the early chronicles, and is to be commended for his verbatim quotations. His footnotes, too, are interesting. But his style is something of a mosaic, and such effusions as "an unperishable nocturne silhouetted against the mists of eld" are not to be commended.

The purpose of the book is not to deal with topographical but with historical questions. For instance, the events immediately preceding Bannockburn occupy fourteen pages, while the four or five devoted to the fight itself give no consideration to the questions existing as to the disposition of the Scottish army on those two eventful days, or the movements of their opponents. Dunbar, where there are also interesting points of topography, is dismissed with a mere mention. As flaws in detail we may note that on p. 23 Shakespeare's "Gentle Duncan" should be "Gracious Duncan," and on p. 89 the date of Otterburn was 1388, and not 1338. Still the book is a painstaking and well-informed work. It is pitched in a warmly patriotic key.

ASIA.

Burma under British Rule. By Joseph Dautremer. Translated and with an introduction by Sir James George Scott, K.C.I.E. London and Leipsic: T. Fisher Unwin, 1913. *Price* 15*s. net.*

In the issue of this *Magazine* for last February we noticed at some length M. Dautremer's excellent book on Burma. We have now before us a translation of the work by Sir James George Scott, K.C.I.E., a distinguished political officer who retired from the service some three years ago. He contributes to the work an introduction in which he inveighs in refreshingly plain language against what he considers the unjust and unwise treatment of Burma by the Indian authorities, more especially in the matter of construction of means of communication. In one passage he compares the Government of India to "a man who would go on selling matches in the street, because he can make a living out of it, and would never dare to dream of the possibility of owning a match-factory for himself, and sending consignments to the ends of the earth"; in another to "a rich uncle who is asked to get a favourite niece a *bonbonnière*, silk and hand-painted, or preferably silver, and puts her off with a couple of bananas or a water-ice instead"; in a third he says "the administrative view is that of the parish beadle, and the enterprise that of the country-carrier with a light cart instead of a motor-van." To those who cannot read M. Dautremer in the original this translation will be very welcome, and the plain speaking of the introduction will give ample grounds for reflection to the Indian authorities, as well as to the reader.

The Land of the Blue Poppy. By F. Kingdon Ward, B.A., F.R.S.E. Cambridge: At the University Press, 1913. *Price* 12*s. net.*

The members of this Society who had the good fortune to hear Mr. Ward's address in Edinburgh and Glasgow in February last will welcome the publication of this volume, and it will appeal to a much wider circle, viz., to the ethnologist, the geologist, the geographer, and, above all, to the botanist. The scene of Mr. Ward's wanderings and studies was a corner of the borderland between Western China and South-Eastern Tibet, a tract of which very little is known, although here and there Mr. Ward found outposts of French and English missionaries. It has also been visited by Captain Bailey. Mr. Ward selected the village of A-tun-tsi as the basis of his operations, as the inhabitants were friendly, and there was no difficulty in procuring supplies. From thence he made journeys in pursuit of plants and seeds, hither and thither over the lofty mountain passes which separate the great rivers of the Yangtse, the Mekong, and the Salween. In the course of these expeditions he had several remarkable adventures, not the least exciting of which was an encounter with a band of revolutionaries from whom he received much courtesy and assistance. He came across all sorts and conditions of men, from pompous, pedantic Chinese officials down to semi-savage Mosos and Lutzus, whose favourite weapon is the cross-bow, with which they are fairly efficient marksmen. As in the case of Sir Sven Hedin and other travellers, the Chinese officials seemed bent on thwarting his plans at every turn, and sending him back whence he came, but Mr. Ward displayed the same good-humoured diplomacy as Sir Sven, and outwitted his opponents whenever it was expedient to do so. At the hands of the ordinary villagers he found much kindness and hospitality. As usual he was hailed everywhere as a first-class physician, and his medicine case was often brought into requisition. The book abounds with indications of the skill and tact with which he managed to ingratiate himself with the inhabitants of these uncivilised tracts,

and his observations on their habits, customs, dress, houses, agriculture, and manner of life are of profound interest to the ethnologist. Not less interesting are his observations on the geology of the tract ; but the supreme interest of the book lies in the results of his botanical studies and labours. In an appendix he gives a list of two hundred plants, of which twenty-two are new species. Seeds were obtained of seventy-six species, which are now being grown in Cheshire, and it is hoped will ere long be placed on the market. Mr. Ward is master of a lucid, graceful, and easy style ; he is never dogmatic or wearisome, and, although graphic and even eloquent when occasion arises, he never gives the impression of exaggeration or of writing for effect. The book is illustrated by a large number of very beautiful photographs, all of which were taken by the author. We cordially commend it to the perusal of our readers.

AFRICA.

Life of a South African Tribe. Vol. II. By Henri A. Junod. With numerous Illustrations. London : Macmillan and Co., Ltd., 1913. *Price* 15*s. net.*

The first volume of this work has been already reviewed in this Journal. The second volume shows the same painstaking carefulness, and contains an enormous mass of information, much of which is of the first importance to anthropologists. There are chapers on Land Tenure, Agriculture, Food and Drink, Clothing and Ornament, Houses, Pottery, Boatbuilding, Metallurgy, and Trade. The major part of the volume deals, however, with the characteristics of the Bantu Intellect as revealed in their language, poetry and folklore (of which many examples are given , and especially with their religious life and superstitions. The author describes in exact detail all sorts of rites and ceremonies, the black and white magic, and especially the customs of divination by bones (astragalus) and taboo.

It is impossible in a brief review to refer to the many interesting questions which are involved. There are *e.g.* curious similarities to the beliefs prevalent in classical times ; an interesting parallel in the method of burial to the interment of the palæolithic *Homo mousteriensis*, and a full account of certain sacred woods which are the burial-places of old-time chieftains and are now inhabited by malignant and murderous ghosts.

The author's account of Bantu religion is of great value. At first, like most Europeans who have learnt a native language, he supposed that their religious ideas consisted only of a sort of ancestor-worship. But he discovered (almost accidentally a second set of religious intuitions which he describes as a "Deistic Conception of Heaven." This confused belief in a Supreme Being is in the author's opinion general throughout the Bantu race, and is perhaps the original form of their religion. Heaven sends thunder and lightning, protects some individuals, and punishes others, especially those who steal. There are also in this volume suggestions regarding negro education and religious instruction which should be carefully considered by all who are interested in the native question.

AMERICA.

Things as they are in Panama. By Harry A. Franck. London : T. Fisher Unwin, n.d. *Price* 7*s.* 6*d. net.*

From internal evidence in this book it would appear that Mr. Franck is very much a wanderer over the face of the earth, and in 1912 he betook himself to

Panama with a view to joining the police. Being proficient in Spanish and a number of other languages he was at once employed in the census department, and the first part of this book is devoted to his quaint experiences in it. The American zone, through which the canal runs, is some 50 miles long by 10 wide, and was found to contain a population of 62,810 souls, representatives of no less than 72 separate states and dependencies. Some of the curious scenes and incidents which occurred during the six weeks of the census are very well described. After that Mr. Franck became "Zone Policeman 88." Sometimes he worked as a private detective, sometimes in the ordinary line. The whole force consisted of some 250 rank and file, a very mixed lot, but on the whole "good-hearted, well-set-up, young Americans, almost all of military training," and practically guiltless of "graft." Mr. Franck's experiences as a policeman were also quaint and varied, but we must refer our readers to his book for details. It is illustrated with a number of good photographs.

Quebec: The Laurentian Province. By Beckles Willson. London: Constable and Co., 1913. *Price* 10*s.* 6*d. net.*

Previous books on Canada from the pen of Mr. Beckles Willson have served to establish his reputation as an authority on the Dominion, and in this, his latest book, he gives his readers a comprehensive view of the vast province of Quebec, of its rivers and lakes and towns and villages, of its people and their lives. Lying on both sides of the St. Lawrence and stretching from above Montreal on the west to Labrador on the east, the area of the province is greater than that of France and Germany combined, while its population of two millions is three-fourths of French origin. The prevailing stock of Quebec to-day is Norman by descent, and in their religion and folklore the *habitants* still preserve traces of much that was best in old France of the seventeenth century. The fecundity of the habitants is well known, families of twenty being common enough; and it is thus the less surprising that from 69,000 souls in 1763, the time of the conquest, the French Canadians now number over a million and a half.

Mr. Willson lays stress on the power and predominance of the Roman Catholic Church: "The Church—it cannot be repeated too often—is the ruling factor in the life of this people. The priest, or the shadow of the priest, is always by the habitant's side." The Catholic Church in Quebec is really a State Church, and the clergy enjoy the right by Act of Parliament to collect the revenues formerly coming to them before the conquest by the British. On the whole, the rule of the clergy, from the village *curé* to the bishop, appears to be beneficent, and Mr. Willson quotes many instances of valuable technical teaching given in church schools and colleges. He draws a striking picture of the religious life of the city of Quebec, of the services, and of the processions on a holy day. The devotion of the Quebecquois to the French language amounts to a passion. For example, among the mottoes on the walls of the drill hall in Quebec during the sessions of the great Congrès du Parler Français are the following, "Il n'est pas de plus grande gloire que de combattre pour la langue de la patrie," and "C'est un crime de lèse-majesté d'abandonner le langage de son pays." This goes side by side with a loyal devotion to the British flag which preserves to the people the right to maintain their own language and church and usages.

It is impossible even to refer here to the many interesting details which Mr. Willson gives of the various places he visited in his tour through the province, but we may say they are enough to inspire the reader with a desire to go and see for himself.

Having regard to the desolation which might be worked in the country by wholesale destruction of its forests, it is comforting to know that "the Government has recently established an efficient forestry service, headed by forestry engineers of the highest standing, whose staff is to be recruited from the students of a forestry school recently endowed by the Province."

Mr. Willson has also something to say of the sporting features of the province in the shape of hunting and fishing, and it is worth noting that, like the English in the Scottish Highlands, rich Americans have monopolised many of the preserves for salmon and trout in the more accessible of the lakes and rivers.

We have no hesitation in recommending Mr. Willson's book as a mine of information about a very attractive part of Canada.

The War of Quito, by Pedro de Cieza de Leon, and Inca documents. Translated and edited by Sir Clements R. Markham, K.C.B., Vice-President of the Hakluyt Society. London: Printed for the Hakluyt Society, 1913.

In this, the latest of the Hakluyt publications, we have translations by the veteran Sir Clements Markham of a number of documents, which throw a lurid light on one episode in the tangled history of Spanish misgovernment of South America in the middle of the sixteenth century. Apparently the misery and oppression of his Indian subjects had at last come to the knowledge and touched the heart of the Emperor Charles, and he sent out Blasco Nunez as viceroy, with orders to put an end to slavery and to introduce other reforms. However just and praiseworthy the emperor's intentions were, they were confided for execution to an absolutely incompetent and tactless administrator, and were met with determined opposition in all quarters from the Spaniards in America; and this was quite natural, for the wholesale reforms, if suddenly and immediately introduced, meant ruin to them. The head and brains of the rebels—for as a fact the opposition amounted to rebellion was Gonzalo Pizarro, the brother of the conqueror of Peru, who did not hesitate to collect troops and lead them against the viceroy. For the details of the war we must refer our readers to the book itself. The narrative, somewhat garrulously told by a trustworthy simple old soldier, who was an eye-witness of what he relates, is well worthy of perusal. So also are the other documents which form part of the book. Sir Clements Markham has contributed a too brief sequel which completes the story to the death of the ill-starred viceroy. It is hardly necessary to add that the work has been ably translated and edited, and that the notes appended to the narrative, etc., are interesting and illuminating.

A Busy Time in Mexico. By Hugh B. C. Pollard. London: Constable and Co., Ltd., 1913. *Price 8s. 6d. net.*

"For the traveller," Mr. Pollard assures us, "Mexico is a charming country, and offers boundless possibilities to the artist and pleasure-seeker, archæologist, or tourist, and to people in search for something entirely different to everywhere else. Adventure and romance are still to be found, and the primitive is within a day's journey of the railroad. In Mexico there is still the spirit of the early days of the West and places little changed since the days of Cortes." In an appendix to this book he adds, "Mexico needs saving from the Mexicans and Mexican government is a tragic farce." For a significant and convincing proof of these observations our readers could desire no better evidence than the story related by Mr. Pollard. Romance and adventure are to be found in almost every chapter, and more especially in his vivid and graphic details of the revolution of 1911, which ended

in the fall of the famous President Porfirio Diaz. Mr. Pollard was an eye-witness of the occurrences in the city of Mexico at that time, and made his escape to Vera Cruz in a train in front of the one in which the fallen President fled from his capital. But besides a graphic account of the social and political conditions of the country, Mr. Pollard has much useful information to give which deserves the careful attention of any one thinking of making a career in Mexico. Attention to his advice, based on personal experience, will save an emigrant many a disappointment and much expense; to sportsmen and tourists his advice is invaluable. Not less valuable and cogent is his warning to "casuals" against going to Mexico on the chance of picking up a plum. "To succeed in Mexico you need special knowledge of a trade or profession, a good knowledge of Spanish, a sufficiency of capital for your enterprise, and at least a year's experience of the country before you invest a penny of it." The events of the last three years cause Mr. Pollard to doubt whether the development of Mexico, "a great country rich and teeming with possibilities," is possible or even probable so long as the Mexicans are left to govern themselves, and his solution of the problem points to a protectorate by the United States, which could then organise and enforce a stable government, under which an era of internal peace and prosperity would commence. Taking its past history and present conditions into consideration a true friend of Mexico would come to the conclusion that annexation to the United States in some form or other would probably be the best fate for Mexico in the immediate, if not the remote, future.

The Panama Canal. By J. Saxon Mills. Edinburgh: Thomas Nelson and Sons, 1913. *Price* 2*s. net.*

This volume is intended as a popular history and description of the Panama Canal from the time of the first project for a canal, some four hundred years ago, down to the present date. It gives an interesting and lucid account of the greatest work of civil engineering in modern times, and indicates the probable economic and other changes that will follow when the canal is opened. It has good illustrations of the Culebra Cut and the Gatun and Pedro Miguel locks, an excellent bird's-eye view of the canal and the route it traverses, and portraits of Colonel Goethals, the Chief Engineer, and Colonel Gorgas, the head of the Department of Sanitation. The book will be read with interest and appreciation by those who have neither time nor inclination to wade through a lengthy and scientific treatise on the subject.

Panama: The Creation, Destruction and Resurrection. By Philippe Bunau-Varilla. London: Constable and Co., Limited, 1913. *Price* 12*s.* 6*d. net.*

This volume, which is written by the eminent French engineer and diplomatist who played so prominent a part in the drama which the volume records, is the largest and most exhaustive treatise on the Panama Canal that has yet appeared. The author's object is to vindicate French genius, conception and enterprise alike in the eyes of his own countrymen and of the world in general, to exonerate the French pioneers of the great project from the stigma of incompetence and blundering wastefulness and peculation, which the intermediate collapse of the project unjustly attached to them, and to justify his own ideas, schemes and methods in carrying out the work; as well as to furnish a permanent and reliable history of the project from its inception to the present day, when it stands on the verge of successful completion. He deals with the project in its three stages, viz., "The Creation, The Destruction, and The Resurrection." The first heading embraces under it the project in all aspects

and stages from the earliest scheme in 1513, until the financial wreck of the company in 1888. The period of "Destruction" lasted until 1899, during which time all efforts at resuscitation signally failed, and the project appeared hopelessly doomed. The "Resurrection" began in 1899. There was a fierce and protracted controversy, or "battle of the routes," Panama versus Nicaragua, and another battle over the question of a high-level lock canal, or a sea level canal, ending in the victory of the Panama route and the high-level project. On the heels of this followed the secession of Panama from Colombia, the details and justification of which the author enters into at considerable length. The actual work of construction was then begun, and has since been so vigorously and successfully carried on in face of seemingly almost insuperable difficulties, that it is fully expected that the first vessel will sail through the canal in October, although it will be some months later before the waterway is opened for general traffic. The volume closes with "Supplementary Chapters," dealing with "The Key of the Secret of the Straits," about which the author holds very pronounced views; "The Panama Tolls," "The Fortification of the Straits," etc. It contains a number of excellent illustrations of the work done by the French engineers, and photos of prominent persons connected with the project. Engineers, contractors, financiers, and others interested in the carrying out of great public works will find the book a veritable mine of valuable information.

GENERAL.

Notes and Queries on Anthropology. Fourth Edition. Edited for the British Association for the Advancement of Science. By Barbara Freire-Marreco and John Linton Myres. London: The Royal Anthropological Institute, 1912. *Price 5s.*

This is a new edition of a booklet first published in 1874, with the object of promoting accurate anthropological observations on the part of travellers. The last edition was published in 1899, and the science of anthropology is making such rapid progress that even in this relatively short interval considerable changes have occurred. Despite its avowedly utilitarian object the present edition is full of interest, and the sections relating to religion, morals, government, and so forth show especially with what care and precautions the study of primitive man is now being carried on. We have drifted as far from the "noble savage" standpoint as from that of the "soulless brute." Indeed, we feel disposed to wish that some of the statements and recommendations of those *Notes and Queries* might reach a larger public than that for which the book is intended. The instructions as to the carefully qualified acceptance which should alone be given to the statements of "earnest politicians" among savage peoples, might well be repeated to a larger public, and with a wider reference!

A Turkish Woman's European Impressions. By Zeyneb Hanoum. Edited, and with an Introduction, by Grace Ellison. London: Seeley, Service and Co., Ltd., 1913. *Price 6s.*

Zeyneb Hanoum is one of the heroines of Pierre Loti's novel *Les Désenchantées*, which is of much interest in that it gives an extraordinarily vivid account of Constantinople and of the life of its educated women at a time of great social change. The present book describes the effect upon such a woman of experience at close quarters of the customs and manners of Western Europe. Perhaps naturally Zeyneb Hanoum's sojourn in the West ended in further disenchantment and a return to

Turkey. The interest of the book lies in its presentation of Western ways by an Eastern.

EDUCATIONAL.

A Commercial Geography of the World. By Frederick Mort, M.A., B.Sc., F.G.S. Edinburgh and London: Oliver and Boyd, 1913. *Price* 2*s.* 6*d.*

This is an admirable text-book and ought to take its place as the best of the smaller volumes on commercial geography which have appeared within the last few years. Its lucid style, well-chosen matter, and careful arrangement are all to be commended. A large number of figures renders the book most useful, and mention should be made of the series of excellent graphs. Of special value are Figs. 1, 2, 5, 8, 9, 12, 14, 17, 22, 30, 31, 34, 39, 65, 70.

The introductory chapter is sound and sane, and might be read with profit by others as well as teachers or students of commercial geography. The same might be said with truth regarding the chapter on "Geographical Factors that influence Commerce." In the description of commercial commodities are to be found very valuable paragraphs on wheat, coal, and cotton. It may be doubted, however, whether the technical paragraphs on the making of steel can in strictness be said to deal with commercial geography. The treatment of the separate countries is fully causal.

A few minor inaccuracies have crept into the text. Aberdeen is not mentioned as one of the chief trawling ports, p. 86; Kashmir is spelt correctly on the map, p. 137, but as Cashmere, p. 135, and as Kashmere, p. 140 the word, by the way, does not appear in the Index; we prefer Trans-Atlantic to Transatlantic, p. 107 (cf. transatlantic, p. 203, and Trans-Caspian, Trans-Caucasia, Trans-Siberian in Index); Trondhiem has become Tronhiem, p. 218; Kiev has become Khiev, p. 244; Triest, map, p. 234, and text, p. 235, has become Trieste, map, p. 236; the names L. Victoria Nyanza, L. Albert Nyanza, and L. Albert Edward Nyanza, Fig. 85, are surely out of the date; it is somewhat misleading to speak of "Indian" labour, p. 313. These may seem trifling errors, but we expect accuracy from one of Mr. Mort's standing.

A Text-Book of Geography: Practical and Physical. By R. M. Munro, M.A. Edinburgh: John Cormack, 1913. *Price* 3*s.* 6*d. net.*

The name of the writer is new to us, but Mr. Munro has now made his mark in Geography. The main defect of the book, and it is a defect at which we need not cavil overmuch, is that it is too encyclopædic in its scope, with the result that causal connections are somewhat lost sight of, and that the short paragraph style is too much in evidence. Mr. Munro's bent seems to lie to the mathematical side of Geography, for chapters i., ii., iii. and xvii. are exceptionally well done. We note, for instance, that the volume under review is among the very few text-books which deal satisfactorily with the problem of the frequency of eclipses, a matter which often exercises the minds of young students. Due praise must also be given to the account of the Means of Communication.

The paragraphs on those Heavenly Bodies, the influence in Geography of which is practically *nil*, might well be omitted. Then again, when the author makes a quotation, he might leave the name of the writer of the passage to be discovered by the intelligence of the teacher or student (pp. 40, 255, and 305). When he deals with the Ocean Currents Mr. Munro might have given us more about those of the North Atlantic, which are after all the most important for us. *Kuro Siwo* is so called on Fig. 59, but it is spelt *Kuro Sivo* on Fig. 61 and in the text. Then a

study of Shaw's recent meteorological work might alter somewhat the notes on anticyclones. Further, in Climate, the reasons for the Horse Latitude High Pressures are not adequately given. Is it true that *roches moutonnées* are so called from their resemblance to a sheep's back? Lastly, it might be necessary to state that the Antarctic icebergs do not float according to Fig. 257, and text p. 276.

The general appearance of the book reflects credit on the enterprising publishing house which issues the work, but it might have been improved by a wider margin, more artistic colouring in the maps, and by the omission of such Figs. as Nos. 140 and 142-152.

The book ought to be specially helpful to students who are preparing themselves for the many public examinations in which Geography is a set subject, and for the busy teacher it will provide a *vade-mecum* to assist him in obtaining material for his geography lessons.

Asia: A Supplementary Geography. By J. F. and A. H. Chamberlain. New York: The Macmillan Co., 1913.

This volume, the third in "The Continents and their People" Series, is intended to supplement, not to replace, the ordinary school text-book. Stress is laid on the social conditions of the various Asiatic countries, and thereby the human element in geography is brought into prominence. The accounts are eminently readable, and the information is conveyed in a highly pleasant form. A large number of excellent photographic reproductions embellishes the text. Of these Figs. 4, 8, 11, 22, 42, 68, and 76 seem to us specially interesting. While the three maps given are scarcely up to the standard of similar examples of British cartography, we might well follow the Americans in the art of binding.

The Elements of Geography. By R. D. Salisbury, H. H. Barrows, and W. S. Tower. New York: Henry Holt and Co., 1913.

The three authors who have collaborated in this treatise belong to the Department of Geography in the University of Chicago. The preface to the book makes no mention of special sections assigned to the several writers, but the name of Professor Salisbury, whose *Physiography* is one of the finest works of its kind ever produced, is a guarantee of the soundness of the treatment given to geography. Naturally the principles enunciated in the preface have been applied most fully to the home country, but students on this side of the Atlantic will find much that is suggestive, much that can be applied equally well to Britain. We wish to direct attention especially to the admirable sections on Climate. No fewer than eight of the twenty-one chapters of the book deal more or less directly with this all-important subject, while the treatment of surface-features and their modifications serves as an excellent counterpart. At chapter xvi. we reach Human Geography proper, a subject to which American geographers, following the lead given by Miss Semple, have paid special attention. Mountains, plateaus, the various types of plains, and coastlines are all dealt with, and that fully and attractively, as parts of man's environment. In the Economic chapter the writers have confined their attention to the United States—in fact for the British student the whole book is a commentary from the points of view of Physiography and Ontography on the geography of the United States.

A good index, an extensive series of serviceable figures, a list of plates at the end, and full references at the close of each chapter, are additional merits in a book which must take its place as one of the finest and most exhaustive of the more recent general works of a moderate size dealing with geography.

BOOKS RECEIVED.

Columbia. By Phanor James Eder. With 40 Illustrations and 2 Maps. Demy 8vo. Pp. xxiv + 312. *Price* 10*s.* 6*d. net.* London: T. Fisher Unwin, 1913.

Further Reminiscences of a South African Pioneer. By William Charles Scully. With 16 Illustrations. Demy 8vo. Pp. 384. *Price* 10*s.* 6*d. net.* London: T. Fisher Unwin, 1913.

Outback in Australia: or Three Australian Overlanders: Being an Account of the longest overlanding Journey ever attempted in Australia with a single horse, and including chapters on Various Phases of Outback Life. By Walter Kilroy Harris, F.R.G.S., F.R.C.I. With Map and 29 Illustrations from Photographs. Demy 8vo. Pp. x + 224. *Price* 5*s. net.* Letchworth: Garden City Press, 1913.

A Motor Tour in Belgium and Holland. By Tom R. Xenier. Illustrated. Demy 8vo. Pp. viii + 311. *Price* 10*s.* 6*d. net.* London: Mills and Boon, Ltd, 1913.

Italy in North Africa: An Account of the Tripoli Enterprise. By W. K. M'Clure. With Illustrations and Maps. Demy 8vo. Pp. xi + 328. *Price* 10*s.* 6*d. net.* London: Constable and Co., Ltd., 1913.

The Republics of Central and South America: Their Resources, Industries, Sociology, and Future. By G. Reginald Enock, F.R.G.S. With 16 Illustrations and 9 Maps. Demy 8vo. Pp. 344. *Price* 10*s.* 6*d. net.* London: J. M. Dent and Sons, Ltd., 1913.

Questions and Exercises in Geography. Based on Heaton's "Scientific Geographies." By R. J. Finch, F.R.G.S. Crown 8vo. Pp. 334. *Price* 2*s.* 6*d. net.* London: Ralph Holland and Co., 1913.

The Carolina Mountains. By Margaret W. Morley. With Illustrations. Demy 8vo. Pp. viii + 397. *Price* 8*s.* 6*d. net.* London: Constable and Co. Ltd., 1913.

Pemba: The Spice Island of Zanzibar. By Captain J. E. E. Craster. With 30 Illustrations. Demy 8vo. Pp. 358. *Price* 12*s.* 6*d. net.* London: T. Fisher Unwin, 1913.

With the Russian Pilgrims to Jerusalem. By Stephen Graham. With 38 Illustrations from Photographs and a Map. Demy 8vo. Pp. x + 306. *Price* 7*s.* 6*d. net.* London: Macmillan and Co. Ltd., 1913.

The Battlefields around Stirling. By John E. Shearer, F.S.A.Scot. Demy 8vo. Pp. viii + 96. *Price* 3*s. net.* Stirling: R. S. Shearer and Son, 1913.

Turistrater paa Island. Ved Daniel Bruun. Pp. xxxv + 254. København. Gyldendalske Boghandel, 1912-13.

Les Nègres d'Afrique (Géographie Humaine). Par Cyr. van Overbergh. Royal 8vo. Pp. xii + 276. Bruxelles: Albert Dewit, 1913.

The Awakening of the Desert. By Julius C. Birge. With 25 Photographic Illustrations. Crown 8vo. Pp. 429. *Price* 7*s.* 6*d. net.* London: Heath, Cranton and Ouseley, Ltd., 1913.

A Comparative Geography of the Six Continents. By Ellis W. Heaton, B.Sc., F.G.S. Crown 8vo. Pp. 219. *Price* 1*s.* 9*d. net.* London: Ralph Holland and Co., 1913.

Sketches of North and West Ireland. By Mary Ridsdale Wilson. Illustrated by Jessie S. Wilson. Crown 8vo. Pp. 77. *Price* 2*s. net.* London: A. H. Stockwell, 1913.

Contours and Maps: Explained and Illustrated with Six Full-Page Maps and Forty Diagrams. By Frederick Morrow, B.A., F.R.G.S. Crown 8vo. Pp. viii + 116. *Price* 1*s.* 6*d. net.* London: Meiklejohn and Son, 1913.

The Natural History of the Toronto Region: Ontario, Canada. Edited by J. H. Faull, B.A., Ph.D. Crown 8vo. Pp. 419. *Price 2 dollars.* Toronto: The Canadian Institute, 1913.

Madrolle's Guide Books: Northern China; The Valley of the Blue River; Korea. 43 Maps and Plans. Crown 8vo. Pp. 471. *Price* 15*s.* London: Hachette and Co., 1912.

Visual Geography: A Practical Pictorial Method of Teaching Introductory Geography. By Agnes Nightingale. Book II.: *Continents and Countries.* With 22 page Outline Picture Maps for colouring and completing. Crown 4to. Pp. 48. *Price* 8*d.* London: A. and C. Black, 1913.

The Atlas Geographies: Preparatory. By Thomas Franklin and E. D. Griffiths. 2 Parts. *British Isles* and *Europe.* Crown 4to. Pages 33 and 64. *Price* 6*d. each.* Edinburgh: W. and A. K. Johnston, Ltd., 1913.

National Antarctic Expedition, 1901-1904. Meteorology. Part II. Prepared under the superintendence of M. W. Campbell Hepworth, C.B., R.D., Commander R.N.R. Large 4to. London: Royal Society, 1913.

General Report on the Operations of the Survey of India, 1911-12. Prepared under the Direction of Colonel S. G. Burrard, C.S.I., R.E., F.R.S. Calcutta: Survey of India, 1913.

Report on the Administration of Bengal, 1911-12. Calcutta, 1913.

Burma Gazetteers: Pakokku, Upper Chindwin, and Insein Districts. Rangoon, 1913.

Punjab District Gazetteers. Vols. 2, 6, 8, 10, 14, 19, 25, 32. Lahore, 1912.

Memoirs of Geological Survey. Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for 1912. London, 1913.

Statement Exhibiting the Moral and Material Progress and Condition of India during the year 1911-12 and the nine preceding years. London, 1913.

Census of India, 1911. Vol. V.: Bihar and Orissa; Part III. Tables. Vol. XXII.: Travancore; Part I. Report; Part II. Imperial Tables. Vol. XXII.: Rajputana and Ajmer=Merwara; Part I. Report. Calcutta, 1913.

Board of Agriculture for Scotland: Agricultural Statistics. Vol. I. Part I. Acreage and Live Stock returns of Scotland. London, 1913.

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Campbellton
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Percé
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Tadoussac
Baie St. Paul
Murray B.
Cape Tormentine
Shediac
Buctouche
Richibucto

Illustrating Mr Silva White's Article

CANADA—OROGRAPHICAL FEATURES & RAILWAYS

REFERENCE
Industrial Districts
Present Agricultural Lands
Lands likely to be opened up for Agriculture in the near future
Present Grazing Lands
Present Forest Lands
Fisheries
GREENLAND
ATLANTIC OCEAN
BAFFIN LAND
LABRADOR
NEWFOUNDLAND
QUEBEC
ONTARIO
NEW BRUNSWICK
NOVA SCOTIA
Prince Edward I.
Cape Breton I.
Gulf of St Lawrence
Cabot Str.
Hudson Str.
Davis Str.
Belle Isle
Anticosti I.
Quebec
Montreal
Halifax
St Johns
Boston
New York
Albany
Portland
Toronto
Ottawa
Hamilton Inlet
Frederikshaab
Godthaab
Lichtenfels
C. Desolation
C. Farewell
Resolution I.
C. Chudley
Loks Ld
Akpatok
Nachvak
Saglek B
Hebron
Okkak
Mugford
Hopedale
Adlavik Is
C. Harrison
Cartwright
C. Charles
Battle Harbour
Mecatina I.
Indian House
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Long L.
Pettiskapau
Kanuspiskau
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Mingan Is.
Natashquan
Seven Islands
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Long Rapids
White B.
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NEW YORK
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Illustrating Mr Silva White's Article.

CANADA—ECONOMIC DEVELOPMENT

Scottish Geographical Magazine 1913

THE SCOTTISH GEOGRAPHICAL MAGAZINE.

THE DOMINION OF CANADA: A STUDY IN REGIONAL GEOGRAPHY.

By ARTHUR SILVA WHITE, Hon. F.R.S.G.S.

(With Map.)

(Continued from p. 547.)

PART II.—THE PEOPLE.

POPULATION.

THE following figures show the increase, except in Prince Edward Island, of population during the decade 1901-1911.[1]

	Provinces.	1911.	1901.
	Ontario,	2,523,208	2,182,947
	Quebec,	2,002,712	1,648,898
Maritime	Nova Scotia,	492,338	459,574
Maritime	New Brunswick,	351,889	331,120
Maritime	Prince Edward Isl.	93,728	103,259
Prairie	Manitoba,	455,614	255,211
Prairie	Saskatchewan,	492,432	91,279
Prairie	Alberta,	374,663	73,022
	British Columbia,	392,480	178,657
	Other Territories (including Yukon),	15,463	47,348
	DOMINION OF CANADA,	7,204,527	5,371,315

Decrease in the population of Prince Edward Island—the most densely occupied Province of the Dominion—is probably accounted for

[1] *Parliamentary Paper*: Dominions, 1912. Cd. 6261.

by migration to the Prairie and other Provinces: nearly all are Canada-born on the Island. In general, the movement of the population is, naturally, from the Eastern to the Western Provinces: Alberta and Saskatchewan, in particular, show the highest relative increase.

The British element predominates in all the Provinces except Quebec, which is mainly French in origin: and Protestant denominations are everywhere in a majority save in Quebec. Roman Catholics in the Dominion exceed 2¼ millions. The proportion of foreign born (American, Russian, German, Austro-Hungarian, Chinese, and others) is largest in the Western Provinces and in the unorganised Territories. In the latter, it is estimated that there is not more than one inhabitant to fifty square miles. In 1910 there were 110,597 Indians and Eskimo (in Arctic lands) representing the aboriginal population. The Athabaskan and Algonkin tribes are the most widely distributed. The Indians are grouped in reservations—as small and as wide apart as possible—and give little or no trouble. In Eastern Canada they follow industrial pursuits, and the franchise has been extended to them.

Following is the population (1911) of the principal cities and towns:

	Inhabitants.
Montreal, ...	470,480
Toronto, ...	376,240
Winnipeg, ...	135,430
Vancouver, ...	100,333
,, (North and South), . .	23,802
Victoria, ...	31,620
Ottawa, ...	86,340
Quebec, ...	78,190

Immigration into Canada, in 1911, was very active, totalling 351,072 persons. Of these, 130,102 came from the United States, and 175,000 from the United Kingdom. English immigrants have increased by 20 per cent., and Scottish by 30 per cent. The total increase, as compared with 1910, was 40,000. There was a relative increase in the number of British over American immigrants, and a relative decline in the influx from other countries. During the twelve months from April 1, 1911, to March 31, 1912, emigration to Canada was even higher:[1]

From Great Britain, ...	138,121
,, the United States, . . .	133,710
,, other Countries, . . .	82,406
Total, .	354,237

Characteristics.

The emergence of a national type out of the two good stocks on which it is founded, in Canada, has been necessarily affected by the proximity and close intercourse of the United States, no less than by

[1] Statement by Mr. Buxton in the House of Commons, Oct. 21, 1912.

the influx in large numbers of Scotsmen in Nova Scotia and of the United Empire Loyalists into the Maritime Provinces. But the blend marks off Canada, in its social and national characteristics, from the American Union, and carries on the traditions of the Mother Country, except that there is no leisured class in the Dominion.

The Americanisation of Canada, introduced through the newspaper press rather than by the flood of emigrants to the Dominion, does not appear to have affected materially the more conservative and idealistic elements of the population, based on its Northern ancestry. The born Canadian is suspicious of talkers and hustlers, and his farm is more his home than his place of business: he is not for ever on the tiptoe of expectation. But his ignorance of the Mother Country, in its modern aspects, is great, though not so great as in the reverse direction: in both cases, ideas of each other are based on information some generations out of date.

Constitution and Government.[1]

Canada is a Self-Governing Dominion of the British Empire. The Governor-General is appointed by the King. The Executive Government is vested in the Crown, and is exercised by the Governor-General, assisted by a Privy Council chosen and summoned by himself. The Cabinet is a Committee of the Privy Council, consisting at present of fifteen of the principal members of the Dominion Government, or Ministers.

Supreme legislative power is vested in a Parliament consisting of the King, a Senate, and a House of Commons. The *Governor-General in Council* appoints Lieutenant-Governors for the Provinces, and, in certain circumstances, removes them: appoints also officers for the effectual execution of the Constitution. Each Province has a Legislative Assembly: in Quebec and Nova Scotia there is also a Legislative Council, forming a Second Chamber. Unlike the Constitution of the United States, that of Canada vests the Dominion Parliament with exclusive legislative power in all matters except those specifically delegated by the Constitution to the Provincial Legislatures, which on their side possess the power of altering their own Constitutions. Territory not comprised within any Province is governed by a Commissioner and a Council of four appointed by the Governor-General in Council.

The Judges are appointed by the Governor-General in the Superior, District, and County Courts throughout the Dominion, except in the Probate Courts of Nova Scotia and New Brunswick. His Excellency has the right of pardon and reprieve.

As regards bills passed by the Provincial Legislatures, the Governor-General is in the same position as the King in Council for Self-Governing Colonies. His salary (£10,000 a year) is paid out of the Consolidated Revenue Fund of Canada.

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[1] *Colonial Office List*, 1912: *Analysis of the System of Government throughout the British Empire* (Anon.), p. 79.

The Lieutenant-Governor of a Province is assisted by an Executive Council composed usually of the chief officials who possess the confidence of the Provincial Assembly. Manhood Suffrage prevails to a very considerable extent.

The Central Government, which assumed the Provincial Debts existing at the time of the Federal Union, pays to each Province an annual allowance for purposes of government and an annual subsidy, *per capita*. Divergence of interests—inevitable in a young and rapidly expanding Colony - there has been in the past between the Central and Provincial administrations; but a tendency towards consolidation of interests, rather than the exercise of restraint by the Central Government, is markedly supporting a true national and imperial policy, and is giving effect to that material unity which Canada has sought to attain, in all earnestness and sincerity.

Local self-government in municipal affairs is general, and it has been developed to the fullest extent.

Ottawa is the seat of the Dominion Government, which is represented in the United Kingdom by a High Commissioner, resident in London.

Atlantic Provinces.

The United Empire Loyalists and emigrants from the Highlands of Scotland, who found new homes in a New Scotland, encountered familiar surroundings in the bold coastlands of Nova Scotia; and the Nova Scotian Assembly is the prototype of our Colonial Parliaments. Nova Scotia—itself all but an island—together with Cape Breton and Prince Edward Islands, reproduce many of the physical features of the British Isles, and, with New Brunswick, represent a stage of transition from oceanic to continental conditions. But the earliest colonists were French, who called the country L'Acadie.

Nova Scotia.—The capital city, Halifax, with its magnificent harbour on the Atlantic coast, was—and is, though not actively—an important naval base for the British fleet. Since the Boer war, Halifax has been taken over, for naval purposes, by the Dominion Government. It is a thriving seaport, open, unlike the ports of the St. Lawrence, to the world's shipping all the year round; and, like the port of London, it serves as a distributing centre—at least in the winter months—for Canadian produce and foreign imports. The city of Halifax has a University (Dalhousie), and is the centre of educational as well as of industrial life. West of Halifax county, on the south coast, is Lunenburg county, peopled by the descendants of German settlers who emigrated from Hanover in 1751.

Although agriculture and mixed farming—chiefly fruit-growing and dairy farming -are the principal occupations of the people, the fisheries of Nova Scotia give employment to about 14,000 men. Thousands of men, too, are employed during the winter in the forests, which, though greatly thinned out, yield good supplies of pulp-wood. The "marsh" lands, formed by the phenomenally high tides of the Bay of Fundy, are of peculiar value to the dairy farmer, and the land reclaimed is of inex-

haustible fertility. We have referred already to the mining industry, which gives employment to a considerable section of the population.

The vast majority of the people are of British stock.

Prince Edward Island, the smallest Province of the Dominion, is also the most densely populated: 47 inhabitants to the square mile, the mean for the whole Dominion being 1·9. Scotsmen predominate, followed by English and Irish, with an increasing number of French Canadians. Here the forest has been cleared to make room for farms, which cover practically the whole Island: "the million-acre farm," it is called. Charlottetown—the only city in the Island—is well situated on a bay in the middle of the south shore.

A considerable portion of the population are employed in industrial pursuits, but the bulk are farmers. The Provincial Government, as in other Provinces, for many years has carried on a stock farm, and has imported also a number of pure-bred stock, besides establishing model orchards: while the farmers themselves have organised co-operative agricultural associations. Many of the smaller farmers engage also in the "fisheries," chiefly lobsters and oysters.

Education is free; and for higher education the Prince of Wales College is maintained at Charlottetown. There are many churches on the Island, the majority being Protestant: and there is also a strong Roman Catholic community. Social life, to a large extent, centres round the churches.

New Brunswick, though nearly as large as Scotland, has relatively only one-tenth of the population. Originally the most densely afforested of the Maritime Provinces, the coastal lands have been cleared and deep inroads made in the central parts for farming. Most of the pine timber has gone, but there remain spruce and a great variety of hardwood, the products of which are exported in large quantities, besides being sent to other parts of Canada and to the United States.

The forest and the fisheries, to a certain extent, have distracted attention from farming: but agriculture flourishes, not only in the broad valleys and on the undulating plain, but along the banks of many streams running through parts of the country still devoted chiefly to lumbering. The county of Northumberland, in the north-east, contains the largest area of wild land. In the valley of the St. John River—on which Fredericton, the capital, is situated—and in the valley of the Miramichi River—which divides the county of Northumberland—there are good farm lands and many farmers. The establishment of cheese and butter factories all over the country has raised this branch of agriculture to the first place.

The Provincial Government imports cattle, sheep, and pigs of the best breeds, and sells these by auction at prices below cost, on condition that the animals be kept in the Province: the farmers also co-operate among themselves. A dairy school is maintained at Sussex.

The bulk of the population—scattered over the country districts—are of British stock, descended mostly from the United Empire Loyalists. There are three universities in the Province, one being a State institution at the capital. St. John, at the mouth of the river of that name is

a much larger town than Fredericton. It is a seaport, railway terminus, and manufacturing centre.

River and Lake Provinces.[1]

The settlement and development of Quebec and Ontario Provinces have been determined largely by the well-defined geographical conditions that make of this region one of the most favoured in America for economic growth. The extensive system of waterways, great variety and wealth of natural resources, and a people welded together out of the descendants of two great colonising powers, combine to give the River and Lake Provinces of Canada advantages of unique value. In Ontario the English, and in Quebec the French elements predominate; but in the Dominion Government at Ottawa harmony and identity of interests may be said to prevail over local and racial prejudice. The absorption of New France into the body politic of our premier Colony is one of the most notable achievements of British Colonial polity, and a favourable augury for the experiment now being worked out in South Africa between British and Dutch elements. Even the bi-lingual impediment, which in South Africa retards complete fusion in the present generation, has been overcome to a great extent in Canada by the logic of events that could not be denied a prosperous people working towards a common end—the unity and consolidation of the Dominion.

Quebec.—In the Province of Quebec many of the customs, institutions, and picturesque trappings of Old France are enshrined and displayed by a people who, while cherishing their birthright as the first conquerors and settlers, are as loyal to the British connection as any other in the Empire. When the British Colonists further south rebelled against the rule of King George, the French-Canadians refused to join them, and themselves helped the British troops to repel the American invasion in 1775, and again in 1812. The subsequent revolt of the Colonists, both British and French, were ebullitions of patriotism which won freedom for their country by the destruction of the feudal system.

English-speaking people outside the city of Montreal are found chiefly in the southern section, bordering the United States. In the rest of the settled districts of the Province they are scattered very thinly among the French-Canadians. The French spoken is no patois, but the language of Middle France—except in accent—in which some English words and corruptions are traceable.

Like the French in Europe, the French-Canadian is light-hearted, hospitable, industrious and thrifty; and he is fond of politics. Almost all are Roman Catholic, and devoted to the Church, to which they pay a percent-

[1] The Dominion Government have come to a decision as to the settlement of the question of the extension of the boundaries of Ontario and Quebec. Quebec obtains the territory known as Ungava, and Ontario that part of the North-West Territories which lies south of a line drawn approximately from the north-east corner of Manitoba to a point fifty miles south-east of Port Nelson, the remainder of the country south of the 60th parallel being allotted to Manitoba. The Provincial Legislatures concerned in this matter have accorded their assent.—*Dominions Report*, No. 12, for 1911-12 (Cd. 6091), page 64.

age of their produce for maintenance charges. Although about, or nearly, half a million of the people live in Montreal—the commercial capital of the Province—almost two-thirds of the entire population are found in the country districts, where the farmers nearly all own their own land and homesteads. The distribution of the population coincides mainly with the valleys of the St. Lawrence and its tributary, the Ottawa River, which it shares with Ontario: and flourishing homesteads are found in the south, right up to the United States frontier.

Quebec, the capital city, beautifully situated on the St. Lawrence, and most picturesque in itself, has extensive docks and important manufacturing industries. It is the seat of Provincial legislation and administration, and has one of the oldest universities in Canada, named after the first bishop, Laval.

Montreal—the Liverpool of Canada—with rapidly developing interests in shipping and manufactures, is a busy centre in which a large and influential section of the community is English. The city lies a thousand miles inland from the open Atlantic, but the St. Lawrence River is here a mile and a half wide. It is the headquarters of the Canadian Pacific Railway, which crosses Canada to the Pacific Coast, and also of the Grand Trunk Railway: other lines radiate in all directions, linking up this important distributing centre with the American Continent.

Montreal is rich in churches and cathedrals—so rich, that Mark Twain once said he could not throw a stone without breaking a church window. The largest are the Roman Catholic cathedral, built on the plan of St. Peter's at Rome, and the ancient parish church. Christ Church is the Anglican cathedral.

The educational system of the Province is adapted to the requirements of the people. Roman Catholic institutions are both many and large. The Church of England maintains a university college at Lennoxville. As an educational centre Montreal ranks high, its McGill University being comparable to Harvard and Yale in the United States: and there is a famous agricultural college, created by Sir William Macdonald, at St. Anne's.

Other urban centres are the old French settlement of Three Rivers, between Montreal and Quebec: the city of Hull on the Ottawa River, and the industrial town of Valleyfield, with its cotton and paper mills. Sherbrooke is the capital city of the eastern townships, charmingly situated on the banks of the St. Francis River. St. Hyacinthe is a centre of the leather industry. Northwards of the St. Lawrence, a manufacturing centre is growing up on the banks of the St. Maurice River, where the Shawinigan Falls are utilised as a power station.

When winter comes, the lumbermen invade the densely wooded area lying north of the cultivated valleys of the St. Lawrence and Ottawa Rivers. Much of the land being of good quality, the farmer is making inroads into the forest: and it is also a favoured region for sport and residential estates.

Ontario.—The leading Province of the Dominion was discovered and opened up by a band of famous explorers—Champlain, founder of Canada; Joliet, discoverer of the Mississippi: and La Salle, who navi-

gated that mighty river to its mouth in the Gulf of Mexico—and missionaries who, together with the intrepid "runners of the wood," braved perils by land and water in untracked Ontario, the record of which is among the most romantic in pioneer literature. But the solid and enduring foundations of the structure we know to-day were built up by the Loyalists and others of British stock, as in the Maritime Provinces. Ottawa, the seat of the Dominion Government, is situated in Ontario, on the right bank of the Ottawa River, which flows eastwards for one hundred miles to its union with the St. Lawrence near Montreal. Ottawa is very much smaller than Toronto.

Toronto, on the north-west shore of Lake Ontario, is second only to Montreal in population and importance. Nearly half of the Canadian banks have their headquarters in this city, in which there are numerous factories, department stores, and wholesale warehouses. Its university is the largest in the Dominion; and it is perhaps the leading centre in Canada for the newspaper press. Toronto is the political capital of the Provincial Government.

Ontario leads the way in manufacturing activity. In towns too numerous to mention, mills and factories are busy. Iron and its products, from tin-tacks to locomotives—and, in particular, agricultural machinery—support a large and increasing industry. In the south-western peninsula—surrounded by Lakes Huron, Erie, and Ontario—which is covered by a relatively dense population, this activity is at its highest. The great coalfields of Pennsylvania lie on the other side of Lake Erie, and Niagara Falls are near by to supply power. A great iron and steel industry is being created at Sault St. Marie, where the waters of Lake Superior spill into Lake Huron.

The Provincial Government has set aside some ten million acres of wild land in northern and western Ontario as a forest reserve; and in the peninsula the Algonkin National Park provides a game and fish sanctuary. Allusion has been made already to the forest and mineral resources of Ontario. Neither these nor manufactures constitute the principal wealth of the Province. Ontario is essentially a farmer's country. The whole of the peninsula, between the Ottawa River and Detroit River, at the United States frontier, is an agricultural country. Wheat and oats are raised in very large quantities, as well as maize, barley, peas, roots and hay; but a large proportion of these field-crops are consumed as food for the live stock used in dairying. Ontario makes more cheese than any other Province. Fruit-growing, too, especially in the south, round Lake Erie, is a profitable industry: in all this favoured district of orchard land the peach and vine grow to perfection. At Guelph there is a well-known agricultural college; and the Federal Government maintains experimental farms and orchards in many parts, including the central one at Ottawa, at which emigrants and others receive training.

In the eastern counties, as might be expected, French-Canadians have settled in considerable numbers; but the Province as a whole is essentially British in settlement. In the county of Waterloo there is a strong German contingent: and Negroes, Indians, and half-breeds are scattered throughout.

There are about six thousand free public schools, many High Schools and Collegiate Institutes, besides the Universities of Toronto and Ottawa. The Province is mainly Protestant: but, although denominational grouping prevails, as elsewhere in Eastern Canada, no Church is privileged.

Inland Provinces.

Manitoba and the great North-West is indissolubly connected with the name of "The Company"—the famous Hudson's Bay Company, with Prince Rupert at its head, which received from Charles the Second a grant of some two and a half million square miles of territory round Hudson Bay at an annual rental of "2 elks and 2 black beavers." Its fortified posts—chief of which was Fort Garry, south of Lake Winnipeg—became trading centres, to which the Indian and other trappers brought their pelts: and its treatment of the natives was proverbially good. One of the first acts of the Federal Government was to buy out the monopoly of the Company: and, when settlers began to come in to the "North-West," the Red River district was organised and Fort Garry became Winnipeg by name.

The phenomenal growth of this Prairie City and the rapid development of the vast area of wheat lands to the west are among the leading achievements in the settlement of British North America. Other branches of agriculture have proved no less successful: and dairy farming has made great progress. The Dominion Government maintains an experimental farm at Brandon.

About eighty-five per cent. of Manitobans are English-speaking: and by far the greater number of these were born either in the Province itself or are immigrants from Ontario. Waves of immigration have swept in from south-eastern and north-western Europe, leaving settlers from many lands. While a large number of the Roman Catholics are the descendants of the old French fur-traders, Presbyterians predominate.

Elementary education is supported out of public funds. The Province does not lack High Schools and Colleges. At Winnipeg the University of Manitoba is well equipped.

Saskatchewan.—The physical features of Manitoba—a gently rolling prairie, mostly bare of trees—are continued in the southern borders of the newer Province of Saskatchewan, but the further one proceeds west the drier the country becomes. This dry patch carries good wheat-lands in the south-east and south-west, with an agricultural and stock-ranching population that is rapidly increasing. In the well-watered park-lands to the north, mixed and dairy farming have better opportunities.

The people are of various origin, having come in with a vast stream of migration that has increased the population of Saskatchewan and Alberta over five times within the last decade. Most of the people are English-speaking immigrants from other parts of Canada, the Home Country, and the United States: while many of the emigrants from the States are Old-Canadians. Galicians and Scandinavians are numerous.

Regina, the Provincial capital, is the headquarters of the famous North-West Mounted Police. It has a university college.

Alberta.—The twin-province of Alberta resembles Saskatchewan in its population and resources. The vast high-plateau in the south, which formerly was the home of the cattle-king and the cowboy, is, in spite of a light rainfall, suitable for autumn-sown wheat: and land is being brought under cultivation. Irrigation has been introduced in southern Alberta, where the land slopes down from the mountains: and here beets are grown for sugar. Cattle-ranching still flourishes in among the foot-hills of the Rockies and elsewhere, and horse-ranching supplies local requirements for the farm.

Railways are opening up the country rapidly, and settlers follow in their track. In the northern half of the Province, beyond the reach of the railway at present, the well-watered forest-lands are the home of fur-traders, who bring in their skins to the Hudson's Bay Company's stores at Edmonton.

The growth of Edmonton, the Provincial capital, has been very rapid within the last decade: it is now a city with fine public buildings and a university. Edmonton, too, like Calgary—which rivals it—is an important railway centre.

Pacific Province.

The discovery of gold, in 1858, let in a rush of population. Thirty-three thousand men from the Californian mining camps came up in one summer to prospect the valley of the Fraser River and its tributaries; but they disappeared as suddenly, with disappointed hopes. This influx, however, led to the organisation of the Province. Gold-mining continued, until the discovery of rich deposits in the mountainous Caribou district brought on another invasion of gold-seekers from California, Australia, and other parts.

British Columbia, on joining the Federation, stipulated for a trans-continental railway to link up its rich mineral lands with the Eastern Provinces. Thus, the Canadian Pacific Railway was carried to, and created, Vancouver—now the largest city of the Province and the fourth largest of the Dominion. Victoria, the Provincial capital, stands at the southern end of Vancouver Island. The railway terminus and seaport at Prince Rupert are, in like manner, the creation of the Grand Trunk Pacific Railway.

Chinese and Japanese labour was drawn upon largely in the early days of settlement, with a result that their exclusion or strict limitation nowadays are topics that closely concern the Provincial Legislature, which is anxious to keep British Columbia essentially a white man's country. The bulk of the population is British in origin—mainly by direct emigration—and includes a large contingent of Canadians from other parts of the Dominion. The influx from the United States has been very considerable, and Scandinavians also are numerous. Protestant denominations predominate.

The Territories.

East of the Yukon, to which reference has been made, lies Mackenzie Territory, which comes under the authority of the Crown exercised by the Royal North-West Mounted Police. Its northern shore, washed by the Arctic Ocean, is visited by these smart troopers and by whalers from Bering Sea. Both in Mackenzie and in Keewatin, which includes the western shore of Hudson Bay, there are some missionaries and fur-traders, but otherwise no white population. Ungava, too—between the eastern shore of Hudson Bay and Labrador Coast—is little visited.

There are over one hundred thousand Indians and half-breeds scattered over the Dominion, and their numbers are not increasing. A majority of these are found in Manitoba and the North-West Territories; but over twenty thousand remain in each of the other regional areas surveyed by us: British Columbia, Ontario, Quebec, and the Maritime Provinces. Dr. Bryce, of Winnipeg, classifies the aborigines under (1) Algonkin, (2) Dakotas, or Sioux, (3) Chippewayans, or Athabaskans, (4) Indians of British Columbia (Iroquois in the north, Salish and others in the south), and (5) Eskimo. The great Algonkin family is the connecting link between East and West; but the origin of by far the most remarkable of these tribes, the Iroquois, is lost in hopeless obscurity. The great reformer and lawgiver of the Iroquois, Hiawatha, who rose to power in the middle of the fifteenth century, constructed a federal system which revived the Five Nations and survives to this day, although his scheme for a confederation of all the tribes fell short of fruition.

Trade and Commerce.

An appreciation of Canadian literature and art should, properly, precede the consideration of trade and commerce; but exigencies of space preclude more than this passing reference.[1] Of trade and commerce, too, to which incidental references have been made already, little need be said in this place. The oversea trade of the Dominion is expanding, the gross figures for the year 1912 exceeding, for the first time, 200 million pounds sterling. In 1912-13 the proportion of imports from the United Kingdom to total imports was 20·3 per cent., whereas that of the United States was 65·5 per cent.

The economic development of Canada is indicated by the stages through which she has passed in her experimental search for a fiscal policy. Under the French *régime* she was ground down by monopolies set up and supported by a ruthless administration of military autocrats. "Let us beware," wrote Montcalm, "how we allow the establishment of manufactures in Canada: she would become proud and mutinous like the English. . . . So long as France is a nursery to Canada, let not the Canadians be allowed to trade, but kept to their wandering, laborious life with the savages, and to their military exercises."[2] Cession of the country to

[1] Cf. *Canadian Life in Town and Country*, by H. J. Morgan and L. J. Burpee (p. 192); and *British America*, vol. iii. of the "British Empire Series," in which Sir J. G. Bourinot gives a short review of Canadian literature.

[2] Quoted in *Canadian Life*, *op. cit.* (p. 63).

England brought some relief: but the prohibition of foreign trade was maintained. The Navigation Laws restricted external commerce to the Mother Country and the Thirteen Colonies, and thus set up a preferential policy which was met in England by substantial reductions in the tariff. But this growing trade collapsed on the abolition of the Corn Laws. It revived, however, between 1855 and 1866, when a Reciprocity Treaty was in force between Canada and the United States. The treaty was abrogated by the Republic, but not before Canadians had sown their wild oats and settled down to business: it helped materially to break down antagonistic interests and hostile tariffs between Province and Province, leading eventually to Federation and the pooling of economic interests.

This was not accomplished without much friction between the Conservative and Liberal parties, the final issue of which was fought out at the General Election of 1911, when Reciprocity with the United States was the question at issue. When Parliament was dissolved, the Liberals held 133 seats and the Conservatives held 88 seats. When again it met, the Conservatives held 131 seats and the Liberals were reduced to 87 seats: a complete landslide, which destroyed the Reciprocity Agreement by which Canada would have become "an adjunct" of the Republic, and definitely confirmed the adherence of Canada to "the old house." While controlling her own fiscal policy, Canada, through the Underwood Tariff, will derive nearly all the benefits suggested by the Reciprocity Agreement.

The Customs tariff of Canada is protective, but preferential towards the United Kingdom and most of the British Colonies. It is urged by Tariff reformers in the United Kingdom that Reciprocity with Canada and the other Dominions should replace—where these exist—Free Trade restrictions at present prevailing.

The banking system of Canada, though marked by efficient Government control, is very accommodating, the banks being allowed to increase their note circulation when the needs of commerce demand it: this is important for Canada, whose trade expands and contracts with the seasons. The value of English money is fixed by law, a sovereign being worth 4·86⅔ dollars, and a crown being worth 1·2 dollars.

A branch of the Royal Mint is established in Ottawa: sovereigns and half-sovereigns coined there are legal tender in every country under the British flag. Only five coins are used in Canada: the 50-cent piece (half-dollar), the 25-cent piece (quarter-dollar), corresponding to the shilling, the 10- and 5-cent pieces, and the copper cent, about equal to a halfpenny. Paper money, issued by the Government and the banks, is used universally for all sums from one dollar upwards.

Consular Service.—The British Consular Service is open to Canada and the other Dominions. The Canadian Trade Department is furnished by our Foreign Office with Consular Reports, as required; and any Canadian firm may apply for information direct to British Consuls, who will report thereon. Canadian Trade Commissioners (resident in Europe, etc.) are at liberty to apply to British Consuls for advice and assistance. Members of the Canadian Commercial Service, who may be accommodated with office-room—if available—in British Consulates, are eligible for the

Illustrating Mr Silva White's Article.

CANADA—DENSITY OF POPULATION

The Edinburgh Geographical Institute

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British Commercial Service, under an arrangement that has been come to between our Foreign Secretary and the Canadian Minister of Trade and Commerce.[1]

External Relations.

We now have reached a stage at which we can report progress. We have seen the bold Elizabethan navigators and adventurers opening up the horizon of the New World. We have followed in the path of conquest and empire, and we have witnessed the flow of settlement from east to west across British North America—deepest in the Eastern Provinces and thinning out to a few rivulets passing through the Rockies to the Pacific Province. All that we have experienced, so far, has been enacted well within the North Temperate zone—dipping, indeed, into the Arctic—under conditions not dissimilar, save in degree, to Northern Europe: but enacted in so vast a theatre, that in many parts the human element is all but lost to view. Finally, we have to realise that in the people of Canada we find a definite grouping, but not too disproportionate a share in numbers,[2] between the British and French elements of national life, in which English ideals prevail so strenuously that, like Aaron's rod, all other elements are thereby absorbed. It is an English country from end to end, save in Quebec, which, though not imperial-minded, is thoroughly loyal and constant to the British cause—which, indeed, is their cause, inherited through their Norman ancestry. What Canada wants is men and money—more men and more capital—to develop her boundless resources and to foster her national life. Sir Wilfrid Laurier, the eminent French-Canadian, characterised Canada as "the gem of the British Crown." Rather, we would regard the premier Colony of the Empire as Britain beyond the Inland Seas, to whom is entrusted the task of carrying on English traditions and European culture. The women of Canada, too, are more identified with industrial and social progress than are their cousins in the Home Country. They have inspired many of the most vital social reforms and educational advances. Woman, in Canada, is the bulwark of religion, and reigns supreme in the home, upon which the whole social structure rests—and this, more particularly, is the case in the Province of Quebec.

In our view, Canada is a country which the Dominion Government holds—as in the case of the other Dominion Governments—*in trust for the Empire*: it is not exclusively a country to be used for its own purposes by the favoured few who have their homes there. It has duties to the Empire, as such—duties of British citizenship, so to speak—and these constitute a redemption of the great moral debt which was built up overseas by the blood and treasure of the Motherland.

Defence.—The Imperial garrisons at Halifax and Esquimault were

[1] Statement by Mr. Ackland in the House of Commons, November 26, 1912.

[2] In 1911, English-speaking persons numbered 3,721,944: and French-speaking, 1,649,371. Moreover, French-Canadians claim a million compatriots in the neighbouring Republic, some of whom are returning to the home of their ancestors. Direct emigration from France has ceased long ago.

withdrawn, owing to the patriotic offer of Canada during the Boer War to maintain these prime naval bases at her own expense. The control of Admiralty property at these stations was handed over finally in 1910 to the Dominion Government, on the understanding that H.M.'s ships of war shall be given facilities, and that the naval dockyards be kept up.

In regard to naval defence, towards which Canada makes no direct contribution, the proposal of the Borden ministry to provide for the construction as an emergency measure of three battleships or battle cruisers of the latest type, at a cost of thirty-five million dollars, has not yet been sanctioned by the Dominion Parliament. In the Home Country, Canada is entitled to representation at special meetings of the Committee of Imperial Defence, together with the other Dominions, who have accepted in principle the proposal—brought forward at the Imperial Conference of 1911—that a Defence Committee be established in each Dominion.

The number of men who were trained in the Militia in 1910-11 was 39,512. A scheme has been drawn up whereby the organisation of the Militia in Eastern Canada will be the same in peace as it would be in war. In March 1911 there were 263 gazetted Cadet Corps, the success of which movement has an important bearing on the efficiency of the Militia, which at present is crippled by lack of qualified officers and N.C.O.'s, as well as by the restricted term (twelve to sixteen days) of annual training. The general plan of the Department of Militia and Defence of the Dominion is to organise 100,000 men in first line and 100,000 in second line. The first line, or Active Militia, is making fair progress; the second, or Reserve Militia, is unorganised.

Communications.

Internal.—The Canadian Pacific Railway, 2906 miles in length, traversing the continent, linking up centres of settlement and penetrating new fields for conquest, always has stood in the van of progress. Its work and its policy have been broadly Imperial, no less than vital to the Dominion in its early days of development. Other transcontinental railways have come into existence; and two of these will reach the Pacific by 1914, when the Panama Canal will be open for traffic. The two new lines are the National Transcontinental, or Grand Trunk Pacific, Railway to Prince Rupert, and the Canadian Northern Railway to Vancouver. The Mackenzie and Mann system also is constructing transcontinental connections.

A network of recently constructed railways criss-crosses the Prairie Provinces in their southern parts; and the River and Lake Provinces are fully served by railroads as well as by waterways. The same may be said of the Maritime Provinces, which also have the Intercolonial Railway.

In June, 1911, the railway mileage in operation throughout Canada was 25,400 miles, or over 2000 miles more than in the United Kingdom in the same year; and another 1600 miles of railway were in partial operation.

The Federal Government have undertaken, by 1914, to construct a railway to Hudson Bay—to the tide-water terminus at Port Nelson—in

connection with which it is contemplated to run a line of boats across James Bay to the Nottaway River, where a railway line could be carried to Labrador or Quebec. The road starts from the crossing of the Saskatchewan River at the Pas Mission. The distance from the wheat-fields to Hudson Bay is practically the same as to Fort William, at the head of Lake Superior: likewise, the ocean voyage from the Bay, under favourable conditions, equals approximately that from the St. Lawrence during the period of safe navigation: thus, under favourable conditions, the economic saving would be equivalent to the cost of transportation from Fort William to Montreal. The period of safe navigation is reckoned at four to five months (July to November) for Hudson Bay, and a month less for Hudson Strait, where ice-breakers could be used to keep open the fairway and to signal ice-conditions by radio-telegraphy.

Exports.—The increase in the popularity of the St. Lawrence route, for immigrants and tourists, is indicated by the following figures of traffic by the principal trans-Atlantic lines operating direct between British and Canadian ports during 1911:[1]

Steamship Line.	Westbound.	Eastbound.	Total.
Allan, . . .	61,709	19,330	81,039
Canadian Pacific Railway,	40,200	18,750	58,950
White Star Dominion, .	29,162	12,985	42,147
Royal (Bristol), . .	13,204	6,351	19,555
Donaldson, . . .	9,911	1,771	11,682
Cunard, . . .	5,972	1,080	7,052

The contract for the conveyance of the direct weekly mail (Liverpool-Halifax in the winter months, Liverpool-Quebec in the summer) is held by the Allan Line. Supplemental routes also are used.

The British Government pays £20,000, and the Dominion Government pays £25,000, per annum, to the Canadian Pacific Steamship Company for the trans-Pacific mail service between Vancouver and Hong-Kong, via Yokohama: this is the Empress Line, with two 18-knot steamships, of 15,000 tons gross, and six others. The service is three-weekly from each terminal port: and the contract time, from Liverpool to Hong Kong, is 818 hours via Quebec, and 853 hours via St. John, N.B. In 1911 the Dominion Government contracted afresh with the Union Steamship Company of New Zealand for a five years' service, with monthly sailings. Other mail contracts include Lines to Havre, South Africa, Central American and Mexican ports. The Holt Line (Liverpool) operates to Vancouver via the Suez Canal and Asiatic ports.

The Great Lakes are well lighted; and cargo vessels from Lake ports reach the Atlantic without breaking bulk. In 1910 over 36,000 vessels, aggregating nearly 43 million tons, passed through the Canadian canals. Freights were chiefly in grain, iron ore, timber and coal: and the preponderance of traffic is from west to east. But nearly 80 per cent. of this traffic is American. A comprehensive scheme for the improvement of the navigation on the Great Lakes and the Welland and St. Lawrence canals is in course of construction.

[1] *Canada To-day* (Annual), 1912.

Cables.—There are thirteen cables between the United Kingdom and Canada, all of which are under American administration. The only completely British-owned cable is from Halifax to the West Indies, via Bermuda. It is, however, proposed—as complementary to the All-British Pacific Link—to lay an Atlantic Imperial cable from Blacksod Bay, on the west coast of Ireland, to Halifax.

Improved steamship and cable services, in support of the Dominion Government's trade agreements with the British West Indies, have now been arranged.

Radio-telegraph, or "wireless," stations, open to ship and shore communications, are established along the Atlantic and Pacific coasts, on the St. Lawrence, and round the shores of the Great Lakes. At Glace Bay (Cape Breton Is.) there is a high-power public service station, for trans-Atlantic messages.

ITALIAN EMIGRATION TO SCOTLAND.

By Ralph Richardson, F.R.S.E.

An Italian visiting Scotland must be struck with the fact that, go where he will, he will almost certainly find a compatriot engaged in business. There is scarcely a village in Scotland without its "Italian Ice Cream" shop, a gaily decorated place of business, with the Italian National flag painted outside, plenty of mirrors inside, and, to Scotsmen, a strange foreign name on its signboard. At one time the Italian emigration to Scotland took the form of men selling stucco casts of figures from the antique, often of considerable beauty; at another time, Italians were, and still are sometimes, conspicuous as organ-grinders or travelling musicians. Now, however, Italian emigration has followed a more important and more lucrative channel, and we have throughout Scotland Italians occupying shops for the sale of ice-cream, confectionery, and other refreshments, taking part in Scottish trades and hotels, and becoming regular, resident, Scottish citizens.

One would imagine that Italians suffering from poverty would hesitate about a voyage to distant Scotland, with a different language, climate, and manners to their own. It is, however, their very poverty which first propelled Italians there, although latterly their business is so widely and solidly established that Scotland draws to itself Italians of the hardworking, but by no means impecunious class. While well-to-do Italians seldom visit Scotland, working Italians emigrate there in large numbers, and apparently are quite satisfied with the financial results. They know that they go not merely to a wealthy country, but also to a people who have always regarded Italians as friends, and who enthusiastically admired Garibaldi—

> "A name that earth will not forget
> Till earth has roll'd her latest year."[1]

[1] Tennyson on Garibaldi, who planted a tree in the poet's garden.

There is also a fellow-feeling between Italians and Scots, for they both went through a "War of Independence" in the course of their history.

By the kindness of Signor Lagorara, Italian Consul-General for Scotland, my attention was drawn to an interesting article on "The Italians of Glasgow," which appeared in the *Weekly Mail* (special) of October 21, 1911. This article states that "the first real invasion" of Scotland by Italians took place "about forty years ago, when there arrived in Glasgow from Tuscany a few sellers of statuettes, and about the same time there came over some Swiss-Italians, who, in consequence of a landslip in their native Canton, had to depart into the world to seek their fortune. Some of the latter found refuge in Italy, some went to London (among them being the now well-known Gatti and Monaco), while others came to Glasgow." There they noticed that on holidays and Sundays the shops were shut, so some of the Italians supplied on those days "various refreshing drinks and a species of iced refreshment, popularly known as ice-cream." The success of these ice-cream sellers induced other Italians to emigrate, and in 1911 there were in Glasgow no fewer than 300 ice-cream shops served by 900 of the 2000 comprising the total Italian population of the city. It may be remarked, with regard to such shops being kept open on Sundays, that Italians and foreigners generally are accustomed in their own country to regard Sunday as the great holiday of the week, and a day to be largely devoted to recreation. I have observed this even in Calvinistic Holland, much more in Lutheran Germany.

Signor Lagorara, in a letter with which he favoured me, dated December 22, 1911, gave the approximate number of Italians actively employed in business in Glasgow at that date as follows:—

Business.	Shops.	Employees.
Ice-cream, etc., . . .	300	900
Restaurants, ...	80	240
Barbers, ...	40	160
Mosaic workers, . . .	...	120
Waiters, ...	...	60
Organ-grinders, . . .	...	20
Ironworkers, etc., . . .	...	100
Produce merchants, . .	...	20
		1620

The *Weekly Mail* states that the Italian immigrants are chiefly "of the crofting class," having been brought up on farms, and know nothing about the ice-cream trade until they arrive in this country. When they return to Italy "they generally resume their old occupation on the farm." With regard to their character, the same newspaper states that, "the Italian, as we know him, is generally hardworking, thrifty, and honest. Other good traits in his character are his sobriety and morality. In a recent year's statistics of Glasgow's police, it is shown that out of

37,707 persons convicted of offences, only forty-five were Italians; twenty-one of these offences were on technical points connected with the conduct of their shops, and only two were serious cases."

The Lord Provost of Glasgow, in the course of an address in 1908, characterised the Italians in Glasgow as "sober, hardworking, and honest, and an example to his fellow-countrymen." The Italian women are excellent housewives, thrifty and economical and good cooks. The majority of the Italians are Roman Catholics.

True to the motto of New Italy, "Italia farà da se," the Italians in Glasgow have established various societies to assist Italian immigrants, morally and materially. Their principal society is the "Mutuo Soccorso" (mutual help), which attends to cases of sickness or necessity. It was established in 1891, and is in a sound financial position, having at its credit in 1911 a sum of £784, 18s., of which £650 is in Corporation loans.

There is also the "Società Italiana di Beneficenza" devoted entirely to charitable purposes, its principal object being the relief of indigent Italians so that they do not become a burden on the local authorities, or have recourse to begging. This society likewise enables Italians seeking employment to travel to other parts of the country; and, in cases of absolute poverty, especially of women and children who have been left destitute, assists them to return to Italy.

We find also in Glasgow a Branch of the National Dante Alighieri Society, with a Consiglio Direttivo (Executive Committee), of which Mr. Ernest B. Thomson has been President from the beginning. He favoured me with a letter, dated 23rd August 1913, in which he stated that "our aim is to provide a number of lectures in Italian and on Italian subjects for the benefit of members and friends. The lectures were given, and meetings, until a few months ago, were held in one of the rooms of the Glasgow Athenæum, but an arrangement was recently made with the Italian Society 'Mutuo Soccorso' for the use of their hall at 130 Argyll Street for all meetings and lectures, and also for a small circulating library we are endeavouring to form. Our society has not yet many members, owing to the fact that most of them are shopkeepers or men employed in shops which are open at the time our lectures are given. We also have considerable difficulty in procuring lectures in Italian in Glasgow, where visits of cultured men from Italy are somewhat rare. On the whole, our members have reason to be satisfied with what our Comitato has been able to accomplish hitherto, in comparison with Comitati which are more favourably placed."

Mr. Thomson also sent me the List of Office-bearers and the Laws of his Comitato, which was established in Glasgow on 26th August 1909, and was the first Comitato of the National Dante Alighieri Society instituted in Great Britain. The Honorary Presidents in Glasgow are the Lord Provost of the city and the Principal of the University, while its President is Professor Phillimore of the University of Glasgow, and its Vice-President is Mr. Francis H. Newbery. The Secretary of the Glasgow Executive is Signor Carmine Alfieri, and its Treasurer is Mr. Robert A. Buchanan, Vice-Consul for Italy, 21 Bothwell Street, Glas-

gow, which is also the official address of the Secretary. Such a society deserves the support of every one interested in Italy, its literature, its history, and its people, and Glasgow may well be proud of being the first in Britain to establish a Comitato.

According to Signor Lagorara, the Italian Consul-General for Scotland, in his letter to me of December 22, 1911, the total Italian population in Glasgow and suburbs was about 2000, and the total for Scotland about 5000. The Italian Consul for Edinburgh and Leith (Sir Richard Mackie) favoured me with a letter dated December 30, 1911, setting forth the number and condition of the Italians there. He stated that "there are close on 950 Italians in Edinburgh and Leith—men, women, and children. Their occupations are nearly all connected with the ice-cream and confectionery trade and fried fish and potato restaurants. There are a few who go round with organs, but not nearly so many as there were a few years ago. There is only one Mutual Society in Edinburgh, of which Mr. Giovanni Dagostino, 121 Leith Street, is President."

While, as far as the Consul is aware, there has never been any article in the newspapers on the Italians of Edinburgh and Leith, and he has no printed matter or reports regarding them, he adds, "But I may tell you that, as far as my experience goes, and I know them pretty well, they are a most sober and industrious class of people."

The last statement comes with peculiar force from Sir Richard Mackie, as he was for some years Provost and Chief Magistrate of the burgh of Leith, and had thus, from his official position, a very intimate acquaintance with its population. His testimony to the high character of the Italians resident in Edinburgh and Leith coincides with that already expressed regarding those resident in Glasgow by the Lord Provost of that city in 1908.

As the majority of the Italians are Roman Catholics, the opinion of a leading clergyman of that Church is valuable. Not long ago, the Very Reverend Canon Stuart, a member of Edinburgh School Board, bore testimony from personal knowledge to the excellent character and industrious habits of the Italians in Edinburgh and Leith.

Although there is a prejudice in some minds against Italians, and indeed against foreigners generally, especially as immigrants, a broader view is taken by well-informed authorities such as the Editor of the *Spectator*, who, in an editorial note (May 10, 1913), assured a correspondent that "we needed no proof of the assertion so often made in these columns, that the Italian peasant is an admirable immigrant, and that a new land in want of settlers should be glad to get him and his wholesome blood, large family, and saving habits. As has been proved over and over again in many generations, the mixture of English and Italian strains is excellent." While Scotland is anything but a "new land," the character of her immigrants is as important to her as it is to any newly settled country.

We have seen that, beginning some forty years ago, the emigration of Italians to Scotland has gradually increased, until now there are about 5000 scattered throughout Scotland, occupying in many cases

positions of commercial importance and acquiring considerable wealth. Unlike their compatriots in the United States, they prefer to start shops in towns, and do not care much to work as railway navvies or as labourers, although, in special cases, they act as mosaic workers, of whom there are 120 in Glasgow alone. I was told that, in laying the caissons of the Forth Bridge, Italians were employed, as their magnificent lung development (so noticeable in their public singers) enabled them to remain below water longer than men of other nationalities.

Just as Italians are increasingly arriving in Scotland, the Scots are leaving it in numbers which are causing national alarm. Seeing that during the first half of 1913 some 35,000 Scots sailed for Canada or the United States, which will henceforth be their homes, those who depended upon them in Scotland for their support—whether intellectual, moral, financial, or as labourers—may well look with foreboding on the future of Scotland. For our Scottish emigrants are usually men and women in the prime of life, full of health and energy, otherwise they would not, and could not, be emigrants. By an Act passed on February 20, 1907, the United States accepts as immigrants only aliens who are sound in mind, body, and morals.

It is therefore a drain of blood of the highest quality which is pouring from our native land into one of the Britains overseas or into the United States. It has affected the Scottish labour market—railway and farm servants, foundry and factory hands being now scarce; indeed at Brechin feeing market it was "stated that, owing to the scarcity of labour, more than one farmer has been entirely depleted of workers."—*Scotsman*, June 4, 1913. It has even affected the religious atmosphere of Scotland and occasioned the lament of Sir Colin Macrae, in the General Assembly of the Church of Scotland (May 23, 1913), that "it was probable, nay, almost certain, that the decrease of 3000 in the number of scholars attending that Church's schools was due to the large emigration which had taken place from our shores during the last few years and which seemed to be rather increasing than diminishing. The birthrate in Scotland was steadily falling, and, in addition, there was the vast stream of emigration draining away the strongest youth of the country."

No one denies that for the "individual Scotsman," as the *Spectator* lately put it, it may be a good thing "to determine for himself whether he will continue to live under the British flag in a difficult climate in the north of Britain, or whether he will transfer himself and his home to another country under the same flag, where he will find ampler space and the opportunities for a larger life." This may be a good thing for the individual Scotsman and for the British Empire; but is it an altogether good thing for Scotland, whose teeming industries cannot be carried on if Scotland is permanently deprived of labour on a large scale, and whose many agencies for the advancement of the best interests of the people of Scotland will be crippled if the young and vigorous are, in increasing numbers, carried away for ever from Scotland, to distant shores!

The arrival of a multitude of Italian immigrants will not, from the

point of view of the predominant Scottish Churches, better the situation, for the Italians will be Roman Catholics; but they will supply for Scotland, as they have long done for France, a counterpoise to a decreasing native population, and will furnish a laborious, thrifty, and sober class of tradesmen and operatives which no country would undervalue. Already the great Scottish mining industry has been indebted to Poles for much of its development: and, if Scotland has thus profited by the labour of Slavs, it may also benefit by the industry of members of the Latin race.

SOME OF THE ECONOMIC EFFECTS OF THE PANAMA CANAL.[1]

By Professor A. W. Kirkaldy.

In estimating what the economic effects of the opening of the Panama Canal will be, it should be noted that from the broad business point of view there are two spheres—(1) the local, (2) that of world trade, in which it is likely to have considerable, though different effects.

Beginning with the second of these, it has been realised, though perhaps not so clearly as it should have been, that there will be other factors affecting the situation in addition to the saving of distance. But until the new route is fully available for commerce it will hardly be possible to realise every consideration that will weigh with importers and shippers. Some light, however, may be thrown upon the subject by a consideration of a few of the factors which have been and will continue to be taken into account, either directly or indirectly, in deciding (*a*) who shall supply certain markets with either manufactured goods, raw materials or food stuffs; and (*b*) what routes shall be taken by the shipping which performs the necessary work of transport. No route can possibly furnish the whole of these factors, and as here as in other spheres the less important has to give way to the more important, the final decision will depend on the balance of advantages.

The principal of these factors, arranged rather in their natural order than in order of importance, are:—

(1) Distance.
(2) Tolls.
(3) Freights and the possibility of continuous freight earning.
(4) Fuel stations—coal or oil.
(5) Insurance rates.
(6) The political factor.
(7) Rates of exchange.

[1] A paper read before Section F (Economics) at the Birmingham meeting of the British Association. The paper is excerpted from a book by the author on *British Shipping*, which will shortly be published by Messrs. Kegan Paul, Trench & Co., who have kindly permitted this paper to be printed.

(8) Invested capital and banking facilities.

(9) The human factor (manufacturing and commercial ability, experience of trade and markets, present possession).

1. *Distance.*—The lessening of an ocean voyage by a few hundred miles may have a very direct effect in decreasing the cost of transporting goods, and so should favourably affect freights in the interest of the importer. A modern steamer represents a large amount of capital; there is connected with the working of such a ship considerable expense each day for wages, food, fuel, and running expenses generally; and then in addition to this there is interest on the capital, depreciation, and other items inseparably connected with the business of shipowning. Thus mileage run in the case of cargo transported by sea is a serious factor with which shipowners have to reckon. In this shipping offers a great contrast to railways. When railway trucks are once loaded, length of haul has comparatively little effect on the cost of the service. Thus superficially one would expect that a route saving about 2500 miles, as will be the case via Panama on the voyage between England and New Zealand, and New York and New Zealand, would very considerably benefit the eastern manufacturing States of America at the expense of British manufacturers, and have a very marked effect in assisting the progress of the American mercantile marine at the expense of the British shipowner. Even though the ships of both countries pay the same rate of toll, the saving of distance promises to give a great advantage to both the American shipowner and the American manufacturer.

The keenest competitors for the supply of manufactured goods in the world's markets at the present moment are the United Kingdom, the United States of America, and Germany. All three of these must be affected to some extent by the opening of the Panama Canal. So far as the mere saving of distance is concerned the United Kingdom and Germany will suffer or benefit together, for the short distances between the exporting ports of North-Western Europe are practically negligible in the long sea voyage to the Far East, or even to South American ports. Thus when making a comparison between London and New York, from this point of view, one is really considering the advantages or disadvantages accruing to the manufacturers of Western Europe, as compared with those of the Eastern States of America.

In trying to estimate the possible effects of the opening of the Panama Canal from this point of view, the chief foreign markets of the world demanding imported manufactured goods may be roughly divided into three classes:—

(1) In the first class come all those countries which are in close, or fairly close, proximity to the Canal. These include all the States of North and South America and the adjacent islands. So far as some of these are concerned the transport services should pass through the Canal. From Valparaiso northward, all trade to or from the Eastern States of America and Europe; and from Pernambuco northward, all trade to and from ports on the Pacific coast of North America should almost of necessity pass through the Canal. The effect of the Canal on this trade,

so far as distance is concerned, will be very considerable. From London to San Francisco round Cape Horn is only about three hundred miles further than from New York to San Francisco. The Canal will affect both voyages, but while it shortens the distance from London by 5500 miles, it brings New York nearer to San Francisco by 8000 miles: an advantage of over two thousand miles, which, with the possibility of freedom from tolls for coasting vessels belonging to the United States, will give the manufacturers of the Eastern States a very great advantage in any open markets. The Western States of America will also benefit in another way. It is practically certain that the opening of the Canal will give a great impetus to the immigration of Europeans. Thus a rapid development of States which have hitherto been comparatively unprogressive may be looked for.

(2) In the second class come Australasia and the Far East. At present the shipping supplying these markets has a choice of routes, for some ports there is a choice of three routes, via the Suez Canal, via the Cape of Good Hope, and via Cape Horn; for others only two of these. From the moment that the Isthmus of Panama is pierced, there will be another possibility. This second class shades off gradually into the third class, (3) which comprises ports which will not be directly affected by the new route. It is mainly to the ports comprised in the second class that attention is being directed when an attempt is made to estimate the importance of the Panama Canal to world trade.

There is a parallel which so far as actual steaming or sailing distance is concerned is about equidistant from London via the Suez Canal, and from New York via the Panama Canal. The point of this parallel on the south coast of Australia is represented very nearly by Port Lincoln, South Australia; Adelaide being the nearest of the great ports of Australia. Most of the Asiatic trading ports will continue to be nearer to London than to New York, for though by going via Panama instead of via Suez the distance between New York and Shanghai is reduced from 12,321 to 11,240 nautical miles, London via Suez is nearer by 799 miles, the distance being 10,441 miles. All ports west of Shanghai will remain nearer to London via the Suez Canal than from New York via Panama. For instance, the voyage to Manila will be 2000 miles less from London via Suez than from New York via Panama; indeed, and this makes the point perhaps clearer, it will save something like 200 miles when steaming from New York to Manila to go via Suez rather than by the new route.

On the other hand, all Japanese and New Zealand ports and Australian ports east of Port Lincoln, will be nearer to New York via Panama than to London by any route. For instance, Yokohama will be 892 miles nearer New York than London, Melbourne 831 miles, Sydney 1612 miles, Brisbane 2933 miles, Auckland 3660 miles, Wellington 3717 miles, and Dunedin 3137 miles. Thus, with the opening of the Panama Canal, the chief Australasian ports from Melbourne eastwards, which have hitherto been, roughly speaking, from 900 to 1800 miles nearer to London than to New York, will be nearer to New York by several hundred miles. If it be correct to reckon the normal cost of

transporting a ton of goods 1000 miles at about two shillings, then, even though the Suez and Panama tolls be of equal amount, this saving of distance will give the manufacturers of the Eastern States of America an advantage of from two shillings to seven shillings and sixpence a ton on any goods they may export to Australian and New Zealand ports between Melbourne and Wellington. Here then is the case so far as mere distance to be traversed is concerned : on the face of it one might conclude that the advantage given to American manufacturers would be such that in certain markets Europe would no longer be able to compete efficiently.

At this point, however, other factors emerge, and in considering them it becomes apparent that distance saved is but one of several considerations which weigh with both the importer and the exporter.

2. *Tolls.*—When the Suez Canal was opened to traffic, the great saving of distance between Europe and the Far East operated at once. The only alternative route entailed steaming a distance of 4000 miles further than that via the Canal, and this was sufficient to give the Canal a practical monopoly. So far as tolls are concerned, a diminution in the rate charged, whilst giving satisfaction to the users of the Canal, cannot appreciably increase the tonnage passing through, and on the other hand, an increase in the charges might cause grumbling, but, up to a certain point, would not decrease business. With the Panama Canal the circumstances are somewhat different : there are alternative routes which much of the traffic likely to pass through the Canal might take. Thus the fixing of regulations and tolls is a very serious business. There has been a great amount of discussion on this subject from the political as well as from the commercial point of view. Does the United States Government wish the Canal to be a paying concern like the Suez Company ; will it be content if running expenses are covered, together with a small surplus in addition with which to form a sinking fund to pay off gradually the original cost of construction ; or will the tolls be but nominal, the American Government shouldering the burden almost entirely ? The question was by no means set at rest by the publication in November 1912 of the conditions on which the Canal may be used, and the tolls to be charged. That proclamation, according to some authorities, contravenes treaties made both with Great Britain and the State of Panama. International lawyers and diplomacy must decide as to this. To the plain man the situation is that the United States have constructed the Canal, and think it a good opportunity to administer a check to the monopolistic policy of their own trans-continental railways, and at the same time give an advantage to American-owned tonnage which might give just that amount of impetus necessary to enable it to regain the position it enjoyed seventy years ago.

The main points about the schedule of tolls issued in November 1912 are, that merchant ships carrying either passengers or cargo will pay a toll of $1.20 cents per net ton. Ships in ballast, without passengers or cargo, will pay 72 cents per ton. Men of war will pay 50 cents on each ton of displacement, and naval and army transports will be on the same footing as merchant ships.

So far good, but unfortunately there is another proviso, namely, that ships belonging to the United States register and employed in the coasting trade, except those belonging to railway companies, shall pass toll free.

Against this provision a serious protest has been raised by Great Britain, supported by Germany, whose interests in that part of the world are great and growing. Should the United States Government maintain freedom of tolls for American ships engaged in the coasting trade a number of problems will arise. The press has already discussed this matter very fully, and some of the principal points at issue may be set down. Great Britain contends that under the treaty it was agreed by the United States that the Canal should be open to the commerce of the world on equal terms. Apparently the Americans do not altogether dispute this, but it is urged on their side that when the Hay-Pauncefote treaty was negotiated, the proposal was to construct a Canal through foreign territory, namely, through the State of Colombia. But since then the revolt of Panama has created a new situation, for that State made over to the United States Government, practically in full sovereignty, a strip of country ten miles wide across the Isthmus. The construction of a ship canal through their own territory is, it is contended, a very different thing from constructing one through a foreign State. This may raise one of those nice points of international law which rejoice the heart of a lawyer, but Monsieur Bunau-Varilla, who negotiated the treaty between the United States and Panama, points out that it was specially stipulated in that treaty that the clauses of the Hay-Pauncefote treaty guaranteeing equality of tolls to the ships of all nations should be incorporated in the treaty between the United States and Panama, and that these clauses still stand.

The United States Government may not have been aiming altogether at giving an undue advantage to the American coasting trade in drawing up the scheme of tolls. Indeed it is undoubtedly true that one great consideration weighing with the authorities was the possibility through the Canal of striking a blow against the monopoly selfishly exercised by the trans-continental railways. For ships belonging to these companies are stringently excluded from this benefit. One object of this is to create healthy competition between sea and land transport agencies, and obtain for the community the benefit of a state of competition rather than allow the present unsatisfactory system of monopoly to continue. Perhaps this might have been accomplished without raising international complications, possibly the difficulty may yet be arranged by the United States discriminating in favour of their coasting vessels, or against vessels owned by the trans-continental railway companies, and thus make the dispute domestic instead of international. But if the immunity of tolls for American coasting ships be maintained in spite of protests, or of arbitration on the subject, several interesting points will emerge. Doubtless a full and frank definition of a coasting voyage will be framed by the Government. It would certainly be interesting to see such a definition. A voyage between any ports belonging to the United States is counted a coasting voyage, even the

voyage from New York to Manila is euphemistically so called. It has been hinted that the whole coastline of both North and South America might possibly be included, so that any American ships trading between the ports of the United States and Canada, or of any South American States, would be entitled to traverse the Canal toll free. This would be stretching matters too far, and there is hardly a possibility that it would be seriously considered. But even as the term coasting voyage is at present understood, either the coasting ships themselves will find their operations restricted in a very galling manner, or it may be the strict letter of the regulations will be disregarded. For instance, as at present understood, an American coasting vessel would be barred from touching at the West Indian Islands, or at any foreign port on the coast; for by doing so she would render herself liable to the exaction of the toll.

There would be many difficulties in enforcing full and literal compliance with the regulations. Take, for example, a ship sailing from New York to San Francisco via the Canal. It would require an immense amount of supervision to prevent such a ship proceeding either northwards to Canadian ports, or southwards to ports on the coast of South America, and this difficulty would be intensified in the case of ships trading with the Philippines. The United States enjoy a growing commerce with the Far East. The saving of rather more than a dollar per net ton would give a distinct advantage to American traders. How would it be possible to prevent ships and goods ostensibly going to Manila from going still further east when once clear of American waters? It would clearly not be to the advantage of the American Government to exercise supervision in this matter, and experience shows the hopelessness of getting justice in such a case through diplomatic channels.

There is also another consideration which may be serious indeed to foreign shipping. The nominal toll has been fixed at $1.20 per net ton. It has been estimated that altogether ten and a half million tons of shipping will pass through the Canal during the first twelve months. Accepting this figure for the moment, the total amount produced by the tolls, if all ships contributed, would be something less than eleven million dollars. It is estimated that the cost of upkeep and the running expenses will be about two million dollars a year. An allowance of three per cent. on the cost of construction, viz., $400,000,000, will be twelve million dollars. These taken together amount to a sum of fourteen million dollars per annum. Thus at the outset, even though all ships passing through the Canal without distinction pay tolls, there will be an annual loss on this calculation of at least three million dollars. But if American coasting vessels pass through toll free, this loss will be still greater. How long will the Americans be content to subsidise shipping to this extent? And be it remembered these are the commercial figures only, nothing has been allowed for the amount which must be spent on defensive works and their maintenance. Is the American Government prepared to adopt a policy which will place it in the position of public benefactor, in the first instance to their own coasting vessels, and then to a lesser extent to the

shipping of all nations? It does not seem a likely proposition. The most that can be expected is that the Canal be self-supporting, that is, the tolls received must pay working expenses, upkeep and maintenance, together with the interest on the capital expended. If the sum of fourteen million dollars be accepted as covering these, and then one allows, that of the tonnage passing through one-third will be able to claim exemption of tolls under the coasting vessels clause, then the tonnage on which tolls may be levied would be reduced from ten and a half million to seven million, and it would require not a toll of $1.20 per net ton, but a toll of $2 to produce the required amount. This will be a heavier toll than that charged by the Suez Canal Company, which has been reduced to 6 francs 75 centimes ($1.40) per net ton. Moreover, there are two important considerations connected with the question of tolls at Panama that must be taken into account. Every addition made to the tolls will decrease the amount of tonnage making use of the Canal. Here Panama differs from Suez, as has already been pointed out. Thus the ten and a half million tons calculated on the basis of a toll of $1.20 would shrink considerably were a toll of anything like $2 imposed. The other point is this: the foreigner may not consent to be a dumb beast of burden in this matter. Already Japanese shipping interests have outlined an ingenious policy by means of which the Canal might be rendered almost entirely unremunerative. It has been threatened that in the event of American coasting ships being allowed to pass through the Canal free, Japanese ships bound from the Far East to European or Eastern American ports, will tranship their cargo at a Pacific port whence it may be carried through the Canal free by an American ship, and transhipped again at an Atlantic port, being carried to its final destination in a Japanese ship. It has been calculated that this transhipment would cost something like $2.50 per ton, which on the face of it would be a loss to the Japanese, but if all foreign shipping adopted this suggestion, how long would the American Government maintain the exemption from tolls of the coasting vessels?

Trade and commerce frequently take an unexpected course. It may be that before the Canal is finally opened to traffic the Government will see the wisdom of simplifying the toll system, charging the ships of all nations, including American ships, on one basis. This will settle the international question, and will very considerably free the hands of the Government. Then as to the machinery by means of which coasting ships may be benefited as against those of the trans-continental railways, or even American shipping against that of any other nation using the Canal, this could be more easily arranged by a system of bounties—a system already adequately understood on the other side of the Atlantic.

3. *Freights and the possibility of continuous freight earning.*—For the Panama route to give an advantage to American manufacturers in the shape of low freights, and to American shipping in the form of full cargoes and continuous demand for services (and these two really go hand in hand), there must not only be a large amount of freight from America to Australasia and the Far East, but there must be an

equally large amount of return freight and the possibility of picking up freight along the route. At present the demands of Australasia for manufactured goods are mainly supplied by Europe. The ships transporting these goods go either by way of the Cape of Good Hope, or through the Suez Canal. By the latter route a steamer passes, and may touch at, a number of trading ports. Mails, passengers, or cargo can be picked up, or landed by the regular liners. This does not, to so great an extent, affect cargo steamers, at any rate so far as intermediate freight is concerned: but the regular trading requirements have resulted in providing ample, and on the whole, economical, coaling and other facilities all along this route. Under different conditions the same is true of the Cape route. South Africa demands more bulk than it gives in exchange. Gold and diamonds are not exported in ship loads, nor do ostrich feathers help to ballast a large steamer. Thus the regular liners return to England "flying light," as sailors say. But the route from England via the Cape is exceptionally well supplied with coaling facilities, and it is this, together with the invention of marine engines having a comparatively small coal consumption, which enables so many steamers in the Australasian trade to utilise the Cape route both out and home, instead of going through the Suez Canal, unless this be contrary to the charter-party.

It has been suggested that when the Panama route is available, all-round-the-world services will be organised by the leading shipping companies. This may be the explanation of the attempt made a few months ago by a well-known shipping combination to absorb one of the oldest British companies trading in the Far East. Had this attempt succeeded, it would have been possible (and as there is nothing to prevent the attempt being repeated, it may yet be carried through) to inaugurate in the early days of 1915 a service of steamers from the United Kingdom via the Suez Canal to Far Eastern and Australasian ports, making a circuit of the globe via Panama. This combination would at the same time provide a very complete system by means of which the trade of West, South, and East Africa, both sides of South America, Central America and the West Indies, would all be co-ordinated as integral parts of a remarkably complete network of shipping routes, giving facilities under one management for handling, or at any rate competing for, under peculiarly advantageous circumstances, and with the benefit of long-tried experience and knowledge, the shipping business of some of the greatest markets in the world. American shipowners would find that a combination of this strength would be extremely difficult to compete with, its resources and elasticity would enable it to command existing freight, and to be first in the field whenever and wherever new trades might be opened up.

4. *Fuel-Stations—Coal or Oil.*—The United Kingdom produces large quantities of coal, and this can be carried very cheaply to distant parts of the world where coal is lacking. By loading a cargo of coal, a ship avoids the necessity of going in ballast to certain ports, and any freight carried in this way is money gained. In transport services if either ships or railway wagons have to go empty in one direction, the rates

charged must be considerably greater than if there be a return load, and thus any rate of freight, for the possibly empty journey, is an advantage. It is owing to this that there are low transport rates in certain directions both on shore and at sea. Of the freight carried by shipping rather over one quarter of the weight consists of coal, and English coal, transported mainly by English ships, is to be found almost all over the world.

There are signs that the United States fully realise the advantage that the coal trade is to Great Britain, and undoubtedly in connection with the opening of the Panama Canal a great effort will be made to increase the demand for American coal, not only at the terminal ports of the Canal itself, but at all the coaling stations connected either directly or indirectly with the new routes, and no doubt it is hoped eventually to gain for American shipping all those advantages which now and for so long have benefited the British shipowner. To the extent to which it is found possible to displace British coal in foreign markets and coaling stations, American trade should in the first instance experience a proportional gain, and on the strength of this, it is no doubt hoped, would be able with comparative ease to take up a position of greater importance in the sphere of ocean transport. Thus in the immediate future there will undoubtedly be a period of very keen competition in the various coal markets of the world, and it is of the greatest importance to the commercial and industrial interests of this country that our position be maintained. British colliery proprietors and the miners' unions will be on their trial, and the issue at stake will be the future wellbeing of the whole country. The position should be made perfectly plain to all who have a voice in shaping the relations between capital and labour in this great industry, in order that they may realise to the full their responsibility.

The United Kingdom exports between sixty and seventy million tons of coal each year, and in addition to this sends another twenty million tons abroad for the use of her ships engaged in foreign trade. This gives an immense volume of steady freight which is a great advantage to British shipping. This trade, however, is passing through a stage of transition. Nearly every country is looking seriously into its fuel resources, and in the near future there will be a great fight for supremacy between coal and oil. Coal itself will be subject to modification, and some experts are of opinion that before many years are over it will be exceptional to find coal in use in its raw state away from the district in which it is mined: gases and oils of various grades will be the main products of the colliery. Will America as a fuel-producing and exporting country be able to oust Great Britain from her present position in foreign markets? The solution of this question will have a very marked effect on the future commercial history of the world. The United Kingdom, in spite of its great coal resources, is small compared with America, but the British Empire has vast districts rich in coal and oil resources which are hardly yet known, and for the production of which, so far, only the surface has been lightly scratched. With increasing commerce the United Kingdom may, and probably will, hold her own.

and it may be from the Dominions beyond the seas that America will meet the keenest competition in this other respect. Australia, India, British Africa, and, most important of all, Canada, have the possibility of competing for the supply of fuel for the mercantile marine of the world.

Hitherto British coal has been practically free from competition on the Suez route; from the moment that the Panama Canal is opened a very keen and growing competition will be experienced. The effects of American competition have before this been felt in other industries, nor has the result always been to the disadvantage of the United Kingdom. This threatened competition in the overseas coal trade may have a very much needed effect in making some of our collieries put their house in order. The coal industry of this country may be very effectually awakened by American rivalry, and the whole question of coal-getting, the organisation of the industry, royalties, and the facilities for transport, storage, and loading, may be overhauled and revised with useful results.

5. *Insurance Rates.*—Will probably be the same on both routes.

6. *The Political Factor.*—The working of the Imperial ideal in Great Britain, America, and Germany should be noted.

Preferences granted by the Dominions have materially assisted British trade. The possession of the Philippines has displaced Spain from the position of chief trader there in favour of America. The importance of this factor can be traced in the case of Japan; and China, when settled government comes, will be another notable instance. But it is impossible to elaborate fully this factor here.

7. *Rates of Exchange.*—China has a silver, Europe and America a gold, standard. Rates of exchange affect trading relations. The whole question should be carefully studied. About seven years ago when a Chinese merchant could get exchange on the west coast of America at the rate of 119 taels for $100 gold, it paid him to import thence timber and flour; but at the present rates, namely, 160 taels for $100 gold, this ceases to be profitable business, and he can trade to greater advantage locally. This factor works independently of trade routes.

8. *Finance, Banking, and Investment.*—It has been estimated that the people of Great Britain have a sum of about £2,500,000,000 invested abroad. This vast sum has been advanced partly to our own Colonies and Dominions, and partly also to new or needy countries in every part of the world. Wherever there is fairly good security and the chance of a reasonable return, Englishmen are usually willing to supply capital. In making advances of this nature, it is usual to stipulate that the interest shall be paid in gold, but the merest tyro in these matters knows that it would not be possible either for the creditor nation to export golden sovereigns to the extent of the sum advanced, or for the debtor States to ship golden sovereigns in payment of the interest on their debts. The original sum advanced leaves the shores of the United Kingdom in the form of goods, railway equipment, constructional material, textiles, and other manufactures. The interest, too, comes to these shores in the form of goods, the goods in both cases being covered by bills of exchange

in terms of sterling. The State needing capital thus obtains what is necessary for its development, and when the interest becomes due it can be collected by the creditor in gold, through banking establishments. In this way there have been built up and strengthened trading relations which will exist not only so long as the indebtedness continues, but, thanks to good relations on both sides, are likely to be permanent. To illustrate the importance of this factor in international trading relations, one has but to refer to the States of South America.

Conclusion.—In conclusion there can be no doubt that the opening of the Panama Canal will effect much for the New World. Development on the west coast of America, both North and South, will receive a great impetus. Hitherto emigrants from Europe have felt that the distance and journey to these parts made the western less eligible than the eastern side of North America. The improved sea voyage should do much to remove this prejudice. Local trade too should be greatly increased: facilities in transport doing much to develop trading relations between the east and west coasts.

Both England and Germany will feel growing competition in the supply of manufactured goods in South America, especially in the Republics on the west coast.

Very great benefit will undoubtedly accrue to the West Indies. The West Indian Islands include Bermuda, the Bahamas, and the Greater and Lesser Antilles. Of these Bermuda and the Bahamas belong to Great Britain. Jamaica is the chief of her possessions in the Greater Antilles, whilst the principal islands of the Lesser Antilles are all British. In the same region Great Britain has British Honduras and British Guiana, both on the mainland. All these, but especially the islands, must very materially benefit when the Isthmus of Panama becomes a thoroughfare.

Since Mr. Chamberlain appointed a Royal Commission in the year 1896 to visit the West Indies and report thoroughly as to their existing condition and prospects, these, the oldest of Great Britain's colonial possessions, have grown in public interest, and owing to the impetus given by Mr. Chamberlain's policy, considerable progress has resulted. Still these possessions were situated, as it were, in an ocean [illegible]. The trade has in the past depended to a great extent on local demands, and local industry, in producing food stuffs and raw materials for other parts of the world. The sugar industry, once the great backbone of West Indian trade, has passed through a long period of depression, and gives but little indication of regaining its old importance. Raw cotton, fruit, cocoa, with perhaps some coffee and less tea, are the main agricultural products. Of recent years, however, mineral oil has been worked at Trinidad and some of the other islands. The oil trade may become for the West Indies what the sugar industry at one time was. Especially does this promise to be the case when, instead of being situated towards the end of a [illegible], these islands are on one of the great highways of the world's trade. A wise policy can do much to make these the fuel stations for a great part of the shipping making use of the Canal route. It should be possible to supply American coal on the islands at

the same rates as at the coaling ports connected with the Canal, unless the American Government, in the supposed interests of the Canal, arrange for an artificially cheap rate of coal at their own depots. Further, later on the islands, owing to the local supplies, should be able to attract a large number of, if not all, those ships which either use oil for fuel or have internal-combustion engines. The political factor will doubtless make its influence felt here, but British and many foreign ships will, owing to the convenience of situation and the growing trading possibilities, undoubtedly make use of the islands, especially if they are equipped with up-to-date facilities, not only for trade, but for dry-docking repairs and bunkering. Taking a comprehensive view of the new situation created by the Canal, it would appear that the islands must grow both in commercial and in strategical importance, attractive alike both to population and to capital. So much briefly for the local effects of the Canal.

The effects on world trade can easily be exaggerated: indeed, in many of the reports and estimates drawn up this has already been done. If the new régime in the United States should succeed in freeing her trade and industries from a protection under which shipping is severely handicapped, it might come to pass that if it were found practicable to supply suitable coaling stations along the routes with good cheap coal, a heavy blow would be dealt, not only to the Suez and Cape routes, but English and German shipping would find competition so keen that they would have to fight for very existence. A survey, however, of commercial history tends to reassure one: a position which is the result of centuries of growth can only cease to be effective when it is attacked not only from without, but is subject also to internal decay. At the present moment neither British manufactures nor shipping show any serious signs of internal weakening. On the contrary, the most reliable indications warrant the assertion that at no previous time was the nation more fitted to occupy and enlarge the great position that is the heritage of many generations.

It must be remembered that there is the great question of the awakening of the Far East to be considered in connection with this new route. At the moment it is true that China is in a state of political unrest which is a serious handicap to trade developments. But this state of affairs can only be temporary. In a few years' time one may expect to find China settled down under an orderly system of government. Already the Chinaman has shown his capability in the heavy industries. Iron ore and coal are apparently abundant in China. High-class ore is produced within forty miles of Hankow, and can be put on railway trucks by Chinese labour at a contract price of 5d. per ton. Chinese pig-iron can be produced at a cost which permits it being sold f. o. b. at Hankow at about £2, 10s. per ton. America has already been importing this pig-iron in large quantities. Chinese labour is stated to be within ten per cent. of an equality with the best white labour, and its cost is in comparison very cheap: one report says that wages are one-fifteenth of those paid to white labour at Pittsburg. In a state of political peace, the Chinese should be able to develop enormously their manufactures: and the time may come when not only Chinese pig-iron, but Chinese

structural steel will invade the American markets. The Panama route will assist in this, but one doubts whether the Chinese exports will be transported in American bottoms. The Japanese are being forced to be a commercial nation, and it is rather to be expected that it will be Japanese shipping, steaming via Panama, that will perform services of transport between the Far East and the North American east coast. That the above forecast is not without some foundation the following extract published in a London daily paper last May (1913) seems to show:—

"The President of the American Steel Trust stated before a Government Commission yesterday, that Indian pig-iron is being imported into the United States at a total cost (including manufacture, freight, and duty) of a little more than half the price of the same material produced by the Trust.

"At present the Indian pig-iron can only be landed at this cost on the western coast of the United States, but the opening of the Panama Canal towards the end of next year will bring the Indian producer into direct competition with the manufacturers in the eastern American States.

"New York, *Tuesday*.

"Mr. J. A. Farrell, President of the United States Steel Trust, continued his evidence to-day in the suit by the Government for the dissolution of the Steel Corporation.

"Mr. Farrell stated that pig-iron could be manufactured in India and laid down in Calcutta at 24s. 6d. per ton. There was now under way from Calcutta to San Francisco the first cargo of Indian pig-iron ever brought into the United States. The freight rate was 22s. 11d. per ton, and under the new tariff the duty would be 5½d. per ton.

"Thus pig-iron could be laid down in San Francisco at a cost of about 47s. 11d. per ton, and Chinese pig-iron could be similarly supplied at 44s. 11d. per ton, while the present market price of pig-iron on the Pacific coast was 89s. 7d."

The world is on the eve of great things full of great possibilities, probably the greatest being the awakening of the Oriental. At the moment that this awakening is in progress America, with splendid energy, regardless of money cost, and really regardless of the possible ultimate effects upon world commerce, has taken in hand the cutting of the Isthmus of Panama. This act is awakening the Western world, for it is already making the leading commercial nations consider not only new possibilities, but review old-established ways and methods. It may well be that the greatest effect of the great engineering feat now being rapidly brought to a successful issue by American genius, will be the indirect one of awakening the white man. Thus in an age that can rightly call itself progressive there is to be more progress, new spheres will be developed, whilst the old also will be reviewed. The result of the present transition which is affecting both Occidental and Oriental must be the raising of the world as a whole to a higher plane of civilisation, the West and East, in closer contact, acting and reacting upon each other, bringing in a new era of peace and prosperity, and the enlarging of life in its highest spheres.

COMPLETION OF THE MAP OF PRINCE CHARLES FORELAND, SPITSBERGEN.[1]

By William S. Bruce, LL.D., F.R.S.E.

On two previous occasions I have reported to the British Association the progress of the work in connection with the charting of Prince Charles Foreland. I have now to report not only the completion of the survey, but also during the past few weeks the publication of the map.

The work has been conducted by Mr. John Mathieson, F.R.S.G.S., of H.M. Ordnance Survey (Scotland), and myself, assisted by Mr. J. V. Burn Murdoch, Dr. R. N. Rudmose Brown, Mr. E. A. Miller, the late Mr. Angus Peach, Mr. Alastair Geddes, and Mr. Gilbert Kerr.

The field work was carried on during the summers of 1906, 1907, and 1909, and I may mention that Mr. Gilbert Kerr, who was one of my shipmates on board the *Scotia*, accompanied me on all three expeditions to Prince Charles Foreland. I much appreciated his excellent services, for whilst joining all these four expeditions as "piper," he also showed great aptitude as a naturalist, and was a very able assistant in actual survey work, besides being the strong and handy man of each of the expeditions. Mr. Burn Murdoch and Mr. Miller accompanied me on two of the expeditions, and both gave much skilled assistance in the detailed survey of the Foreland. Dr. Rudmose Brown, who was also botanist of the *Scotia*, the late Mr. Peach, and Mr. Geddes accompanied me on the expedition of 1909, and each gave valuable skilled assistance towards actual survey work. Dr. Brown made a special study and has reported upon the botany of Prince Charles Foreland, and Mr. Peach, whose lamentable death occurred subsequently, while carrying on geological investigations in Egypt, left behind him excellent geological field notes, which are being put together by his distinguished father, Dr. Benjamin Peach, and will be published during the coming winter.

I must also make mention of the services of Captain Napier and Mr. Sword, master and mate of the *Conqueror* respectively, whose excellent help during 1909 materially aided the completion of the chart, and last, but not least, I must thank H.S.H. The Prince of Monaco for his much appreciated help by conveying my party to and from the Foreland on board his yacht the *Princesse Alice* in 1906, for paying almost the whole of the expenses of that season, and for subscribing substantially to the expeditions of 1907 and 1909. To the Prince also I am indebted for having reproduced, entirely at his own expense and under his auspices, the final results of the work of Mr. Mathieson and myself and our assistants. It is this map which I now have pleasure in showing to the members of the British Association.

The plotting has been done during many long night watches in the Scottish Oceanographical Laboratory by Mr. Mathieson and myself.

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[1] Read at the Meeting of the British Association (Section E), Birmingham, September 1913.

The island of Prince Charles Foreland extends along the west of Spitsbergen from lat. 78° 12′ to 78° 54′, and is therefore about 50 miles long, and varies in width from 3½ to 7 miles. At the south end the coast is fissured with fiords which are not more than 200 feet wide and extend for half a mile inland. Then comes the mass of Saddle Mount, and beyond that the island is flat from sea to sea for a distance of about 10 miles. Rising precipitously from this flat there is a group of mountains extending for about 6 miles and cut off by Scotia Glen. To the north of this glen lies the most important and in many ways the most conspicuous group of mountains in the whole of Spitsbergen. These vary in height from 1600 to nearly 4000 feet, the most prominent being Mount Monaco, Mount Jessie and Mount Charles, and the Devil's Thumb: the last was seen by us at a distance of over 80 miles. Owing to the inaccessibility of most of the mountain peaks the method adopted for the survey was to measure two base lines, one at the north end 12,000 feet, and another across the flat land at the south end 20,146 feet. These were measured by a Chesterman steel tape, and from their extremities a network of triangles was spread over the whole of the island, more than 80 summits being observed.

The coastline was surveyed by a measured traverse which was connected with the triangulation at every available point.

Many parts of the coast offered peculiar difficulties, such as the fiords at the south end where measurements had to be taken by subtense method, and along the 20 miles of crevassed glaciers on the east side, where trigonometrical points had to be fixed at suitable intervals as actual measurements were out of the question.

The heights and horizontal angles were observed by six-inch theodolites, and nearly all the heights were observed from at least two independent points, *e.g.*, The Devil's Thumb was observed from more than fifteen points, and heights obtained varying from 2590 to 3610 feet, giving a mean of 2602 feet. Similarly Saddle Mount was observed from over 20 stations, and the heights obtained varied from 1400 to 1410 feet, giving a mean of 1406 feet. This mountain was stated by early explorers to be 600 feet, but later it rose to 800, then to 1000, and latterly to 1200 feet.

Some of the peaks offered exceptional facilities for accurate observation, *e.g.* Mount Charles (3200 feet) is surmounted by a pillar which is over 30 feet in height, and only a few feet in diameter, and Mount Jessie (3351 feet), as seen from the south, terminates in a sharp cone. These and many others could be observed with almost as much accuracy as if a pole had been fixed on their summits.

The depth of the sea was taken in about forty places in the Foreland Sound, which varied from 137 to 5 fathoms.

The magnetic variation was found to be 14° 40′ in 1909, and the dip 73° 23′.

The latitude was observed in five different places. The area of the island is about 250 square miles, half of which is below the 100 feet contour, and one-fifth covered by glaciers: the remainder consists of high mountain peaks and extensive moraines.

GEOGRAPHICAL NOTES.

EUROPE.

Proposed New Highland Road *(With Map).*—The accompanying sketch-map shows the course of the proposed new road from Deeside to Speyside, which it is believed will be undertaken shortly. At present, as is well known, only two tracks, both possible only for robust pedestrians, lead from the head of the Dee valley to the Spey. One, the Lairig Ghru, ascends to nearly 3000 feet. The other, that which it is proposed to replace by a carriage road, follows the Geldie Burn, crosses the low watershed between the Geldie and Feshie valleys at a height of about 1830 feet, and reaches the Feshie at its junction with the Eidart. The Feshie is then followed down to Achlean, where a track turns off to the left to join the road on the right bank of the Spey near Tromie Bridge. At present, between the end of the Deeside road at Linn of Dee and the Speyside road, a distance of about 23 miles intervenes, over which the new road would require to be constructed. The gradients are moderate, but bridges would be required at Linn of Dee to replace the present White Bridge, over the Eidart, and over the Feshie. The sum of £40,000 has been mentioned as the possible cost.

ASIA.

New Land North of Siberia.—Press telegrams state that Captain Wilkitzky, an officer in command of two Russian vessels engaged in surveying the coast of North Siberia, has discovered new land to the north of Cape Chelyuskin. The new land is stated to extend as far north as lat. 81° in long. 96° E., and thus lies to the south-east of Franz Josef Land. We hope to give fuller details in a future issue.

Italian Expedition to the Karakoram.—Dr. Filippi is to lead an expedition to the Himalayas next summer. The explorer intends to spend the present autumn in Chinese Turkestan, carry on observations into Russian Turkestan, winter in Scardo in Baltistan, and early next spring travel to Leh by the inner Indus valley. From Leh the expedition will travel to the Karakoram to survey and map the unknown portion of the range between the Karakoram Pass and the Siachen glacier. The Government of India has subscribed £1000 to the funds, and Major Woods of the Trigonometrical Survey will accompany the expedition.

Exploration of Central Asia.—It is announced that Sir Aurel Stein, K.C.I.E., Superintendent of the Frontier Circle of the Archæological Survey of India, has been deputed by the Government of India, with the sanction of the Secretary of State, to resume his archæological and geographical explorations in Central Asia and westernmost China, in continuation of the work he carried out between 1906 and 1908. For

THE PROJECTED NEW ROAD FROM SPEYSIDE TO DEESIDE

Copyright

PROJECTED ROAD THUS =====

Bartholomew

his journey to the border of Chinese Turkestan on the Pamirs he is taking on this occasion the route which leads through the Darel and Tangir territories, which have not been previously visited by a European. Sir Aurel Stein will be accompanied by his old travel companion, Rai Bahadur Lal Singh, who, with a second surveyor, will assist him in topographical work.

Africa.

An Animal Reserve in Tunisia.—We learn from the *Times* that a reserve is to be established in Tunisia for the wild animals which are being so rapidly exterminated there. For this purpose a wild mountainous stretch of 4000 acres, with an adjoining marsh of 5000 acres, has been secured near Bizerta and offers peculiarly advantageous conditions. There are already inhabiting this virgin district wild boar, hyenas, jackals, foxes, lynx, civet cat, porcupines, eagles, vultures, etc., besides many kinds of waterfowl, including a number of migratory species.

The object is to isolate, so far as possible, this area, and reintroduce those species of animals which, through the spread of European civilisation, have either been exterminated or driven beyond the frontier. The district will be maintained as a permanent "reserve."

America.

Legal Time in Brazil.—According to a note in *Science* a bill has been passed in Brazil fixing time zones there on the basis of the meridian of Greenwich. Four zones are laid down: (*a*) Archipelago of Fernando de Noronha and Trinidad, Greenwich time less two hours; (*b*) the whole of the coast, and the States of the interior (except Matto Grosso and Amazonas) and the part of Para east of a line starting from Mount Grevaux in French Guiana, following the Rio Pecuary to the Javary, then east to the Amazon, and southward along the Rio Xingu to the boundary of Matto Grosso, Greenwich time less three hours; (*c*) State of Para west of the line given above, Matto Grosso, State of Amazonas east of a line drawn on a great circle from Tabatinga to Porto Acre, Greenwich time less four hours: (*d*) Territory of Acre and district west of (*c*), Greenwich time less five hours.

General.

The Future of the International Geographical Congress.—Prof. G. Braun contributed to the May issue of *Petermann's Mitteilungen* a very outspoken criticism of the International Geographical Congress at Rome, and, following upon this article, there appears in the September issue of the same periodical an international discussion of the changes which, in the opinion of the various writers, should be made in the form and constitution of the meetings. A number of eminent geographers take part in the discussion, and the chief point which emerges is that there is a general consensus of opinion that it is time to define the geographer, no less than geography, more strictly. In other words,

the meetings of the Congress tend to suffer from the presence, in too great numbers, of the untrained person. Prof. de Martonne puts the matter concisely by saying that "The Geographical Societies, who are the organisers of the Geographical Congress, are not scientific societies comparable to Geological Societies. The number of their members is so large that the specialists included are more or less submerged (*noyés*)." He adds that a congress is successful only when "géographes de métier" play the predominant part in its inception, and this can only happen when they predominate in the organising societies. He would therefore strictly limit the meeting-place to those towns where this condition is fulfilled. Prof. Davis would keep the congress as quiet and small as possible, so that its members would tend to be only those with a genuine interest in the subject, not persons attracted by the entertainments, excursions, etc. Prof. Eugen v. Cholnoky proposes a division of members into two groups, ordinary members and extraordinary members, the former to be geographers according to a very strict definition, the latter to be members of the general public who are to pay a higher subscription, enjoy diminished privileges, and to be excluded from certain meetings—a proposal which we fear presents practical difficulties.

Many of the writers speak of the excursions which, from the scientific point of view, were certainly disappointing at Rome, and various detailed recommendations in regard to them are made. Thus various contributors emphasise the need of making papers on phenomena exemplified in the local district bulk large on the agenda, and giving strangers every opportunity—practical and theoretical—of learning what has been done, and is being done, in connection with local geography. Finally, various detailed suggestions in regard to the conduct of the business are made, which will no doubt be considered by the organising committee of the St. Petersburg Congress.

Commercial Geography.

The Mont d'Or Tunnel.—We have spoken here several times of this tunnel, which is nearly four miles long, and is on the new Frasne-Vallorbe line. Its construction has been greatly impeded by the tapping of springs of water (cf. p. 91), but it was finally pierced in the beginning of October. The new line of which the tunnel forms a part shortens the Paris-Lausanne route by about 10½ miles, but more important than the actual shortening is the avoidance of a portion of the existing track where the gradients are very heavy, and the liability to snow-block in winter considerable. The construction of the new line has been very arduous, but it is hoped that when completed it will divert to Lausanne traffic which is now reaching the Simplon *via* the new Lötschberg tunnel.

Personal.

The late Professor Arminius Vambéry.—Professor Vambéry, the great orientalist, died at Budapest on September 14 last, in his eighty-second year. While chiefly a linguist with a special knowledge of

oriental languages, Professor Vambery's expedition to the interior of Asia in the early sixties brought him to the notice of geographers. In 1862 he started on a journey to Persia, disguised as a dervish, and ultimately visited Khiva, Samarkand, Herat, Meshed, etc., enduring great privations especially on the way from Khiva to Bokhara. After his journey Professor Vambéry paid his first visit to this country, a visit which was subsequently repeated many times. In 1885 he lectured before the Royal Scottish Geographical Society on *Herat and its Environs*, and his paper appears in vol. i. of the *Magazine*.

EDUCATIONAL.

Geographical Teaching in Scotland.—We noted here last year (vol. xxviii. p. 587) the appointment of a British Association Committee at the Dundee Meeting "to inquire into and report upon the present position of geographical education in Scotland." This Committee presented its report to the Birmingham Meeting of the British Association, and from the report we take the following extracts:—

"I. It is clear that in very many Elementary schools, especially in country districts, Geography teaching is still on the old lines. To quote from one correspondent: 'All elementary teachers (in my district) are of the old school—*i.e.* text-book, map, and memory. I find great difficulty, more in this than in any other subject, in getting them to teach Geography in a reasonable and attractive way.' The causes of this unfortunate state of matters are: (1) lack of knowledge on the part of the teachers, due to the extremely limited opportunities for acquiring instruction: (2) the reluctance, frequently the refusal, of School Boards to supply modern equipment, even such essentials as proper text-books and physical wall-maps. Some Boards issue admirable lists of approved text-books, etc., but, rightly or wrongly, many teachers are of opinion that the smaller their annual bill for such things is the more favourably they are looked upon by their employers. Teachers here and there exist who, at the expenditure of their own time and labour, construct wall maps and simple instruments: but the ordinary elementary teacher who has to undertake many subjects has little, if any, leisure to devote to special work in one of these subjects. Nor can it reasonably be expected of him.

"The 'Memorandum on the Teaching of Geography in Scottish Primary Schools' issued by the Scotch Education Department in 1912, in spite of some defects which need not be mentioned here, as they have already been noticed in several geographical reviews, undoubtedly marks a great advance, and will promote the setting up of a higher standard than before in Elementary schools.

"It is advisable that classes for teachers be held in suitable centres all over Scotland. The experiment has been tried in at least one place with considerable success, and correspondents indicate that the demand for such instruction is both strong and widespread. Secondly, pressure

should be brought to bear upon School Boards by inspectors or by other means to equip their schools with at least modern text books and physical wall-maps.

"II. In the Intermediate stage (ages 12 to 15) a higher standard of teaching is maintained. The Intermediate Certificate examination is here the end in view. Geography is compulsory, but is counted as part of English on the basis of 100 marks to English, and 50 to Geography. No time allowance for teaching is prescribed, but one and a half hours per week is recommended. Needless to say, that allowance is rarely exceeded. Six schools only reported an allowance of more than two hours, one of them giving three hours.

"The Committee notes with satisfaction the recent improvement in the type of paper set in the Intermediate examination, but thinks it capable of improvement. . . . In the compulsory sections it would be advantageous that some further choice be afforded to the candidates, that greater opportunity be given for displaying knowledge of places associated with current events, and that a more reasonable proportion of the marks be allotted to that part of the paper which exercises the intelligence of the candidate.

"The written examination is supposed to be supplemented by an oral examination conducted by an inspector, but this is usually perfunctory, and in some schools the inspector pays no attention whatever to Geography. Throughout the Intermediate course a compulsory minimum time allowance of three and a quarter hours per week would be very beneficial, and inspectors of Geography might encourage attempts at a higher standard of teaching.

"III. In the Post-Intermediate stage Geography is no longer a compulsory subject, except in the case of junior students, who, however, are at no time examined as to their knowledge of Geography. In the Leaving Certificate examination Geography is separated from English, which is the only compulsory subject, is put on a level with other optional subjects, and is allotted 100 marks. It may form one of a 'group,' but the curriculum must then be submitted to the Scotch Education Department for its specific approval. This is not required if a school commits itself to English, Mathematics, and French: or to English, Mathematics, and Latin. It is distinctly laid down that Geography is on the same level with, for example, languages, and that a candidate must spend upon it an adequate amount of time. The Committee finds that the average amount of time spent upon languages at this stage is seven hours per week. The following tabular statement will help to make matters clear:—

	1912.	1913.
No. of candidates for Group Leaving Certificate	2,202	2,290
Successful	1,711	1,739
No. of candidates with Geography as part of Group	195	146
Successful	155	92
No. of candidates who sat Geography examination	319	212
Successful	227	116

"From these figures it will be seen that while in 1912 Geography candidates formed only about 9 per cent. of the total number of Leaving Certificate candidates, in 1913 even that small proportion was reduced to a little more than 6 per cent. The presentations for Geography as a separate paper also fell from 124 to 66; while the number of candidates with Geography as part of their group fell from 195 to 146.

"The Committee has received some information regarding 1912. It is aware of 70 candidates who were accepted by the Department, and who had had an hour and a half, or less, teaching per week. It is also aware of 35 of these candidates who passed. This last piece of information was not asked for in the circular sent out, but some correspondents gave it voluntarily. These figures speak for themselves.

"From the returns received it is definitely proved that the making an optional subject of Geography has practically killed it in the Post-Intermediate stage. Only seventy-two schools sent in information on this point. The average time allowance was just over an hour and a half per week; in nine schools it was more than two hours. Some give an hour or so for the first year, then drop it entirely. Twelve have dropped it altogether. The Committee is aware of some others which have made no returns, but have also dropped Geography. It is a fair inference that a complete census would reveal many more. In only eleven schools has the time allowance been recently increased, and in most cases this increase has been from a totally inadequate to but a slightly less inadequate amount. The Committee is of opinion that this is a very serious matter. It finds that in many Secondary schools, some of them the largest and most important in the country, situated in great educational centres, the pupils cease to study Geography at the age of fifteen. Further, that the average time devoted to Geography up to that age is only an hour and a half per week. Now the time up to the close of the Intermediate stage should be devoted to providing that foundation of fact which is the basis of scientific Geography, and it is only in the Post-Intermediate stage that a pupil is mentally fitted to build upon that foundation by studying Political and Economic Geography—in other words, how man adapts himself to his environment, and how that environment reacts upon man. It is not considered necessary to emphasise the value of Geography as an educational subject beyond expressing the opinion that after a knowledge of the English language there is nothing more essential to the mental equipment of the modern Briton than a thorough grounding in Geography. This is impossible of achievement under the present regulations. It seems only reasonable that Geography be made a compulsory subject throughout the Post-Intermediate stage, and that in this stage also a minimum time allowance of three hours and a quarter per week be fixed.

"IV. *Training Colleges.*—It may be explained that students preparing for the Teaching Profession in Scotland may either receive their training at the Training Colleges, where the course extends for two years, or may continue their professional training with a University course, or may first complete their graduation and then devote one year to their professional training under the auspices of the Provincial Committees for the Training

of Teachers established in the four centres—Aberdeen, Edinburgh, Glasgow, and St. Andrews.

"The University students in training at Edinburgh or Glasgow may include Geography among the subjects required for graduation at the University, but this is not possible at the other centres, where so far there is no University teaching of the subject.

"The position of the subject varies considerably at the different centres. At the Training Colleges of Edinburgh, Glasgow, and St. Andrews, lecturers in Geography have been appointed, and at these centres instruction in Geography forms an integral part of the curriculum for all Training College students.

"At Aberdeen Training College the previous training of the students and their knowledge of the subject are regarded as satisfactory, so that there is now no special instruction in the subject, and attention is confined to the methods of teaching Geography. The classes consist of thirty to forty students, and thirty periods are devoted to the methods of teaching Mathematics, Nature Study, and Geography, so that if the time is equally divided Geography can receive only ten periods.

"At Edinburgh at least thirty periods are given to the study of Geography, and the classes consist of forty to fifty students. At Glasgow the Geography course extends to thirty periods, and for lectures the classes average eighty students, while for practical work they are reduced to twenty-seven. At St. Andrews sixty periods are devoted to the study of Geography, and the classes number twenty-five students.

"The University students in training at the Edinburgh centre receive no instruction in Geography unless they elect to include the subject in their graduation course at the University; a considerable number do so, but the larger number, who do not, are being sent out each year—many to teach in Secondary schools—without any equipment to teach the subject so far as the Training College is concerned.

"At Glasgow the subject has been dropped from the curriculum of the University students in training, and attention is now confined to methods in teaching Geography, in spite of the fact that in very many cases the previous study of the subject has been quite insufficient.

"Finally, recent legislation by the Scotch Education Department, and local conditions at several of the Training Centres, now make it quite possible for students who may have ceased the study of Geography after obtaining the Intermediate Certificate to complete their professional training without much, if any, further instruction in the subject.

"In the opinion of the Committee it should be rendered necessary for all University students in training to have obtained the Leaving Certificate in Geography unless adequate instruction in the subject is provided in their professional course, or unless they include the subject in their graduation course at the University.

"V. *Universities.*—Geography was first recognised by the Scottish Universities in 1908, when a lecturer was appointed as head of a new department in that subject in the University of Edinburgh. The lecturer has an ordinary class extending over the whole session (three

terms) and two advanced classes, each of which is confined to a single term. From the first the ordinary class has qualified for admission to the M.A. examination, Geography being now one of the optional subjects in that degree. One of the advanced classes is a non-graduation class. The other, which is devoted especially to Economic Geography, is the qualifying class for an optional paper for the degree of M.A. with honours in Economic Science. In the five years during which the ordinary class has been held, the attendance has been 48, 40, 116, 132, 98. The attendance at the advanced class varies from 5 to 10.

"The only other Scottish University which so far recognises Geography is Glasgow, where the lecturer was appointed on similar conditions to those in Edinburgh in 1909. There Geography may now be taken as a subject for either the M.A. or the B.Sc. degree. The ordinary class is the qualifying class for the M.A., and the advanced class for the honours degree of B.Sc., and was held for the first time last winter. The attendance at the ordinary class for the four years during which the lectureship has been in existence has been about 30, 65, 73, 94.

"It should be added that under a recent regulation, which comes into force next year, the position of Geography in the preliminary examination for admission to the Arts and Science Faculties of Edinburgh University has been seriously prejudiced. Down to 1913 Geography was one of the branches under the head of English, which is a compulsory subject in the preliminary examination, but from 1914 onwards the only recognition of Geography is in connection with the history of the British people, one of the subjects included in the English syllabus. 'Candidates will be expected to show acquaintance with the social as well as the political history of the British people and the relevant geography.'

"In conclusion the Committee is of opinion that while the worst result of the present regulations for the Post-Intermediate stage is that pupils leave school with a very imperfect and one-sided educational equipment, a subsidiary result of nearly as much importance may soon appear. It is that the majority of the pupils who intend to become teachers will not care to take up the study of Geography again after the lapse of two or three years. Thus the supply of capable teachers will diminish, and once more, as in the past, even in the Intermediate stage, Geography will be entrusted to the 'general' teacher, and it will fall back into its old position of memory work, unintelligent and uncomprehended."

NEW BOOKS.

EUROPE.

With Camera and Rücksack in the Oberland and Valais. By Reginald A. Malby. London: Headley Brothers, 1913. *Price* 10*s.* 6*d. net.*

Mr. Malby is an enthusiast about Alpine rock-plants, and is already known to garden lovers as the author of *The Story of my Rock Garden.* In the present volume he resumes this theme and tells of an expedition which he made to

Switzerland in pursuit of his favourite study. He has made very good use of his camera, and, in a number of colour-plates and monochromes, many of which are marvels of painstaking photography, we get beautiful representations of Alpine flowers blooming among their native rocks. The text of the book gives an idea of the difficulties, and even dangers, which attended the taking of these pictures, and, though he did but little in the way of real mountain-climbing, Mr. Malby is able to give an entertaining account of his experiences among the Alps. We would draw attention to his interesting theory as to the formation of soil for plant life above the tree level (stated on pages 233 to 235), and we can recommend the book to all who intend to take a holiday in Switzerland. Some of the camera pictures of Alpine scenery are very fine.

The Cornish Coast and Moors. By A. G. Folliott-Stokes. London: Greening and Co., Ltd., 1912. *Price* 12*s.* 6*d. net.*

In this book the author has attempted a somewhat formidable task, viz., to take his readers a walk with him round the whole of the Cornish coast, varied by occasional excursions to points of interest inland. He performs this task with considerable success, although it has to be admitted that there is a good deal of repetition in the scenery and monotony in the course of the road. The author, however, has a keen eye for the endless beauties of the scenery and the flora, which, in this district, are exceedingly luxuriant and varied, and the story of the course of the ramble is enlivened with anecdotes and historical reminiscences of not a little interest. The geological and antiquarian features of the locality also receive due attention. We must add a special word of commendation of the numerous photographic illustrations.

ASIA.

Siam. By Pierre Loti. Translated from the French by W. P. Baines. London: T. Werner Laurie, Ltd., 1913. *Price* 7*s.* 6*d. net.*

In its palmy days the temple of Angkor Wat in Cambodia must have been one of the wonders of the world. A competent authority, Mr. Campbell, says of it, "The comparatively few European travellers who have visited this temple all unite in declaring it the most colossally stupendous as well as architecturally beautiful structure they have ever beheld, so that while it rivals or eclipses the Egyptian pyramids in one respect, it hardly falls short of the highest Hellenic standard as regards artistic detail in the other. The huge building, which is between two and three miles in circumference, contains a multitude of courts, colonnades and chambers. There are twelve superb staircases, the four in the middle having from forty to fifty steps, each step a single slab, and over five thousand columns, while everywhere the stones are fitted together in a manner so perfect that the joinings are not easy to find. The walls and portals are covered with sculptures, the exterior of the temple being ornamented with bas-reliefs of scenes from the Ramayana, the great Sanscrit epic poem, with vast processions of warriors, horses and chariots, and animals of all sorts, both real and mythical. Angkor Wat was certainly commenced as a Brahminical temple, but before its completion Buddhism had become the religion of the land, and so it is that we find here, as in the temple of Boroboddo in Java, artistic representations of both the religions." We can easily understand how these magnificent buildings in their present state of decay and ruin would appeal to the imagination and emotions of the famous French traveller Pierre Loti, and in this volume we have a description of his feelings and sensations in seeing them and their surroundings in the winter of 1901. One brief

quotation will let our readers understand what to expect. "I mount the steps of the temple for the last time. No rain has fallen since last night to refresh the suspended plants, or moisten the heaps of stones, and an intolerable heat, as of glowing coal, now emanates from the terraces, the walls and statuary, on which the sun has been blazing all day long. But the divine Apsaras (*i.e.* celestial dancers), who have been used for centuries to be thus burnt with rays, smile at me by way of adieu, without losing their ease or customary gracious irony. As I took leave of them I little thought that within a few hours, by the lavish caprice of the king of Pnom-Penh, I should see them again, one night, at the evocation of the sound of the old music of their times, see them no longer dead, with these fixed smiles of stone, but in the fulness of life and youth, no longer with these breasts of rigid sandstone, but with palpitating breasts of flesh, and coifed in veritable tiaras of gold, and sparkling with veritable jewels." We trust we have said enough to show that Pierre Loti's subject in this book is magnificent, and his treatment of it characteristic.

From a Punjaub Pomegranate Grove. By C. C. Dyson. London: Mills and Boon, Limited, 1913. *Price* 10*s.* 6*d. net.*

In this book Mrs. Dyson, the wife of a junior civilian in the Punjaub Commission, gives a bright and chatty description of a brief sojourn in India, where she saw and heard a good deal in British and in native territory. She evidently enjoyed herself thoroughly, and is well qualified to give an excellent account of what she saw and heard. She was delighted with the country and with the cordial reception she received alike from the natives and the Europeans. Indeed her admiration of the former goes the length of making her exclaim—"as to the Indian aristocracy, where will you find more courtesy, more generosity, more dignity, more of all the qualities that constitute 'a gentleman,' than among the noblemen and high-class Indian people?" She visited a good many places and attended many functions, mixed with all sorts of people, kept her eyes and ears wide open, put the best construction on everything, and had a real good time. The book contains nothing new, but is most readable, and so we commend it to the perusal of our readers. Some of the illustrations are good.

AFRICA.

La Région du Haut Tell. Par Ch. Monchicourt. Paris: Librairie Armand Colin, 1913. *Prix* 12 *fr.*

In this erudite and exhaustive monograph Dr. Monchicourt gives us a minute and detailed description of a very interesting tract in Tunisia known as the Haut Tell. The word "tell" signifies a peculiar kind of soil, "tout sol argilleux recevant chaque année assez de pluie pour en être pénétré au point d'accumuler en lui des réserves aqueuses assurant constamment le complet développement normal des plantes annuelles, céréales et herbages." Thus from its very definition we gather that the area of the Tell is not and cannot be fixed, as it varies with the rainfall of the locality. Dr. Monchicourt has made a patient and detailed study of the tract, and has embodied in this book a luminous account of its geography and history, more particularly during the eighty years during which it has come under the influence of France. He describes from personal observation and a careful study of the literature of the subject its natural features, its economic condition, the distribution and movements of its population, its resources, agricultural and mineral, its means of communication, etc. The book will appeal to but a small circle of readers in this country, but it deserves and will doubtless receive a

hearty welcome from the wide circle of readers in France who are justly interested in everything that relates to their oldest and most prosperous colony in the north of Africa.

AMERICA.

Le Pérou Economique. Par Paul Walle. Paris: E. Guilmoto, 1913. *Prix* 9 *francs.*

We have now before us the fourth edition of a very useful work by M. Walle, in which he sets forth in considerable detail the natural resources and present condition of Peru. His object is stated quite frankly. In his travels in South America in general, and in Peru in particular, he was distressed to notice that France had not taken the definite and commanding position with regard to commerce which he thinks she should have taken. In the race for the trade of Peru she is far behind Germany and England, and this thoughtful and instructive volume has been compiled in the hope that the commercial world of France will rise to the occasion, will not accept the present situation as hopeless or irremediable, but will reform its methods, adapt them to the circumstances of the case, and remembering the old maxim, "fas est ab hoste doceri," will not hesitate to take several leaves out of the German book, and reconstruct their trade with Peru on a new basis and on new lines. This reconstruction is all the more necessary, as M. Walle clearly sees, in the prospect of a more or less early opening of the Panama Canal, which cannot fail to have prodigious and permanent effects on the distribution of commerce between Europe and America and the world generally. This book is written for commercial men and intending emigrants, and thus M. Walle has deliberately refrained from much that might make his work attractive to the general reader. There are no descriptions of magnificent scenery, no thrilling narratives of personal adventure, no notice of the wondrous archaeological remains which are still a puzzle and enigma to the antiquarian, no excursions into the history of a country which is replete with romance and excitement. But for business men and emigrants it will be most valuable and interesting, although it has a fault not uncommon in similar works, viz., the statistics are very often not up to date. Each province and each of the principal towns is treated separately, and ample details are given of its conditions and resources so far as they are known, and it has to be remembered that M. Walle writes from personal knowledge and experience. Considerations of space prevent us from following him into details, but we may remark he is eminently judicious and cautious both in his judgment of the resources of the districts and in the advice he gives to emigrants, to investors, and to commercial firms considering the question of starting agencies or businesses in Peru. The situation, it has to be confessed, although much better than it was, leaves much to be desired. The republic is not yet a hundred years old, and it has already had forty Presidents, so that, although there has been peace and order for a few years of late, capitalists may reasonably hesitate before assuming that revolutions are now things of the past. Then an undesirable and most serious drawback to the development of the undoubted resources of the country is the want of good internal communications of all sorts, a want which has now received the serious attention of the Government with a view to earnest and speedy reform. There are other difficulties which may be mentioned, such as those of the climate, the diversity of races which inhabit the country, the absence of local enterprise and labour, abuses and venality in commerce and justice, etc.: on all such matters M. Walle's opinions and observations are well worthy the attention of English commercial men as well as French.

Les États-Unis d'Amérique. Par P. d'Estournelles de Constant. Paris: Librairie Armand Colin, 1913. *Prix* 5 *fr.*

The author of this thoughtful and instructive book has evidently spent many happy days in the United States during the last ten or twelve years. A French Senator and distinguished traveller and educationalist, he was invited to be present at various functions across the Atlantic, and there he was invariably received with the effusive hospitality and genuine hearty welcome which are characteristic of our American cousins. On his part he lost no opportunities; he made detailed and careful observations and serious study of all that he saw and heard, and he does not hesitate to set forth his views in vigorous and at times dogmatic language, which we fear will not be always received with general approval in the United States. The volume now before us is the latest of a series which the author has been publishing during the last fifteen years. The first half of the volume contains a series of sketches of things worth noting in several of the great cities which the Senator visited in 1911, into which are introduced excursions (we had almost said lectures) on miscellaneous topics, such as votes for women, a possible war with Japan, the influence of Germany, the general ignorance of French, and so on. In the latter half the Senator plunges freely into "la haute politique" in a very wide sense of the word; he discusses education, religion, the race question, economics, including commercial competition, internal and foreign; he denounces emphatically the present Panama policy, that of excessive tariffs, and the assumption by the United States of the part of a colonising power and its consequent entry into foreign politics. We cannot, of course, follow him into any of these thorny subjects, but his obvious earnestness and enthusiasm, his grasp of his subject, and his wide experience all entitle him to a dispassionate hearing. We must add that he writes with all the sparkling vivacity and spontaneity which we expect in an accomplished and practised French author. Even when dogmatic and professorial he is never wearisome or dull. In Scotland there are prevalent a good many theories regarding Paradise. We have to thank M. de Constant for a new one, viz., that Paradise is now on the other side of the Forth. "Que n'ai-je le temps de parler de ce beau domaine écossais que Andrew Carnegie a acheté à Dumfermline, son pays natal, transformé en parc royal réservé aux générations venues après lui: un parc? un paradis plutôt."

Trails and Tramps in Alaska and Newfoundland. By William S. Thomas, author of "Hunting Big Game with Gun and Kodak." With 147 illustrations from original photographs. New York and London: G. P. Putnam's Sons, The Knickerbocker Press, 1913. *Price* 7*s.* 6*d. net.*

Experiences during camping-out in southern Alaska, a short trip to Newfoundland, and excursions round the author's home in Pennsylvania, are here pleasantly narrated by Mr. Thomas. He seems to be as great an expert with the camera as with rod and gun, as the numerous charming photographs of wild life prove. The description of a glacier (pp. 32-34), especially of the origin of crevasses, is inaccurate, but that is a small blemish. There is a good index, and the "get-up" of the book is excellent.

American History and its Geographic Conditions. By Ellen Churchill Semple. With Maps. London: Constable and Company, Ltd., 1913. *Price* 12*s.* 6*d. net.*

This is a re-issue of a book first published in 1903. We welcome it more especially for the sake of the new generation of geography students that has arisen

during the last decade. Miss Semple's style is singularly lucid, and it gives one the greatest of pleasure to follow her arguments, even if one does not go with her the whole way to her conclusions. We may draw particular attention to the concluding chapters—"The American Mediterranean," and "America as a Pacific Ocean Power"—as gaining fresh value in the light of current events.

AUSTRALASIA.

Outback in Australia; or Three Australian Overlanders. Being an account of the longest overlanding journey ever attempted in Australia with a single horse, and including chapters on various phases of Outback Life. By WALTER KILROY HARRIS, F.R.G.S., F.R.C.I. With Map and 29 Illustrations from Photographs. Letchworth: Garden City Press, Ltd., 1913. *Price 5s. net.*

The title of this book is sufficiently descriptive of its contents, except that the journey was from Newcastle in New South Wales by way of Melbourne to Adelaide, returning by the Murray River and the western plains of New South Wales. The average distance covered on each travelling day was 22 miles on the outward, and 28 miles on the homeward journey. The author praises Australian hospitality very highly, but, judging from his narrative, not more highly than it deserves. The most interesting parts of the book are those where the author interrupts his tale to enlarge upon some side-issue which may have emerged during the day's run—*e.g.* "The Outback Goat," "The Rabbit in Australia," "The Outback Parson" the chapters on the Murray irrigation schemes, and the account of the transformation of the so-called ninety-mile desert between the Victoria border and the Murray. We cordially recommend this book to those interested in the modern progress of Australia.

A Naturalist in Cannibal Land. By A. S. MEEK. Edited by FRANK FOX. With an Introduction by the Hon. WALTER ROTHSCHILD, and 36 Illustrations. London and Leipsic: T. Fisher Unwin, 1913. *Price 10s. 6d. net.*

There are in this book 231 pages, and we could easily have put up with double the number. Mr. Meek is one who knows neither hardship nor danger when engaged in the pursuit of "specimens." In Papua, the Solomon Islands, and the adjacent seas he has spent nearly twenty years, and has gathered a rich harvest, not only of birds and insects, but of adventures. All his collections were destined for the Tring Museum, whose owner testifies in a graceful introduction to the author's work. Mr. Meek seems to have managed the somewhat treacherous natives with great skill, chiefly by means of timely firmness. One does not need to be a naturalist in order to enjoy this volume, yet a naturalist will find in it much that is of interest. There is also something for the geographer and the ethnologist, and indeed for every one who enjoys reading about real things. We trust Mr. Meek during his next leisure-spell will be encouraged to give us more. Mr. Fox, the Australian friend who acted as editor, must have had a pleasant task. There are many good illustrations, an index, and an adequate map.

The New World of the South. By W. H. FITCHETT, B.A., LL.D. London: Smith, Elder and Co., 1913. *Price 6s.*

This is an excellent book which should be put into the hands of every boy of the English-speaking nations. It contains a series of charmingly written sketches describing the discovery, exploration, and colonisation of Australia, and in this connection we have brief but attractive notices of famous men, *e.g.*, Cook, Flinders,

Bligh, Oxley, Hume, and Sturt. The narratives are calculated to stir the imagination and fire the spirit of adventure in the rising generation. To this we have to add that Dr. Fitchett depicts in glowing but honest language the miserable condition of the convicts who were the first settlers in Australia, for whose unhappy fate he has a sincere and kindly sympathy. He has also a kindly word for the aborigines, who seem doomed to extinction before the advance of the white man. Interspersed in the narratives are wise and thoughtful observations, which cannot fail to arrest the attention and evoke serious reflection from even a youthful reader. A perusal of this book will set before him in a most attractive form some of the profoundest lessons of history, and will insensibly but convincingly demonstrate the beauty and the power of the manly virtues, such as perseverance, generosity, tenacity of purpose, gentleness, and loyalty to the calls of duty.

GENERAL.

The Log of a Rolling Stone. By Henry Arthur Broome. London: T. Werner Laurie, Ltd., 1913. *Price* 12*s.* 6*d. net.*

Mr. Broome has unquestionably selected an excellent title for this remarkable work. In it we have an autobiography of some forty years of his life, during which he roamed over a great part of the known world, *e.g.* South Africa, India, New Zealand, Australia, Chili, Argentina, Brazil, Patagonia, besides minor excursions into Belgium, Holland, France, Italy and Switzerland; and amongst his numerous avocations we may mention a few, viz. mounted policeman, wood-engraver, journalist, ordinary seaman, railway contractor, convict guard, resident magistrate, whaler, quarry contractor, and stores-clerk. Such an unusually varied life and career could not fail to be intensely interesting, and Mr. Broome tells his story well. He writes with the easy skill of a practised journalist, is not prone to exaggerated language, and although it is the story of his own life, he is not egotistical or over-self-conscious. The greater part of the matter refers to South Africa, to which he returned more than once. At one time he lived there for a continuous period of nearly twelve years, during which he rose in the Civil Service from being a convict guard to being a resident magistrate; but at the end of the Boer War he apparently thoroughly disapproved of the policy and proceedings of the Government and his fellow-countrymen, and he found it expedient to resign and to start off on a new career. It was inevitable that in the course of such a life he should come across some strange characters and have many exciting adventures, and thus the interest of the book is well maintained. Some of the illustrations are from water-colour paintings by the author. We commend the book to the perusal of our readers.

Are the Planets Inhabited? By E. Walter Maunder, F.R.A.S.

The Age of the Earth. By Arthur Holmes, B.Sc., A.R.C.S.

"Harper's Library of Living Thought." London and New York: Harper and Brothers, Limited, 1913. *Price* 2*s.* 6*d. net* each volume.

These volumes are excellent additions to this series. Mr. Maunder comes to the conclusion on what seems to be sufficient data that the earth is the only member of the solar system which is fitted to be the abode of life. Since the conditions which determine the existence of life are so numerous and so stringent it is even conceivable that our planet is unique among the hosts of stars in being the home of organised beings. Mr. Holmes deals with the fascinating problem of the earth's age, a problem which has excited acute controversy between the geologist and the physicist, as well as among geologists themselves. His conclusion

is that in the radioactive minerals will be found the means of reconciling the widely divergent time-estimates.

The Structure of the Earth. By T. G. Bonney, Sc.D., F.R.S. "The People's Books." London, Edinburgh, and New York : T. C. and E. C. Jack, 1912. *Price 6d. net.*

Professor Bonney has given in this booklet an admirable summary of geology which cannot but be helpful to the beginner, and interesting to the general reader. The list of reference books at the end provides a useful guide to future study.

The Statesman's Year-book, 1913. Fiftieth Annual Publication. Edited by J. Scott Keltie, LL.D. London : Macmillan and Co., Limited, 1913. *Price 10s. 6d. net.*

The chief feature of interest about this edition is the fine series of maps showing the progress of the world since the first issue of the annual in 1863. These maps show the enormous increase in the number of railways within this period, especially, of course, in America, Africa and Asia, but also in Russia and other parts of Europe. Very striking are the contrasts between the maps of Africa and Australia in 1863 and in 1913. In the introductory matter, also, special stress has been laid upon the contrasts between then and now. Here again some of the differences in population figures are very remarkable.

Maps and Survey. By Arthur R. Hinks, M.A., F.R.S. Cambridge : University Press, 1913. *Price 6s. net.*

While the present work treats of map-making and surveying, the author writes neither for the map-maker nor the surveyor. In this sense the book is not a text-book, for Mr. Hinks writes for a wider public. There is little that is new in the book, but the established principles of survey work in the field and in the office are explained in simple language. There are chapters dealing with maps, map-analyses, route traversing, simple land survey, compass and plane-table sketching, topographical survey, geodetic survey, and survey instruments. In his treatment under these headings the author has steered clear of a too technical handling of his subject, and by the aid of many well chosen illustrations has produced a work which ought to be read by students in the higher-grade geography class. It is for such that the book has been written, but all interested in geography, especially in the means of representing geographical facts on the map, will find much to interest them.

BOOKS RECEIVED.

Our Villa in Italy. By J. Lucas. Crown 8vo. Pp. 200. *Price 5s. net.* London : T. Fisher Unwin, 1913.

Historical Geography of Scotland. By W. R. Kermack, B.A. (Oxon). Demy 8vo. Pp. 134. *Price 2s. 6d. net.* Edinburgh : W. and A. K. Johnston, Ltd., 1913.

Brief Biography and Popular Account of Unparalleled Discoveries of T. J. J. See. By W. L. Webb. Demy 8vo. Pp. xii + 298. Mass., U.S.A. : Thos. P. Nichols and Son.

The Realm of Nature. Second Edition. An outline of Physiography. By Hugh Robert Mill, D.Sc., LL.D. Crown 8vo. Pp. xii + 404. *Price 5s.* London : John Murray, 1913.

Preliminary Geography. By E. G. Hodgkison, B.A. (Lond.), F.R.G.S. Crown 8vo. Pp. xvi + 225. *Price* 1*s.* 6*d.* London: University Tutorial Press, Ltd., 1913.

Australia from a Woman's Point of View. By Jessie Ackermann, F.R.S.G.S. With Sixty-four Plates. Crown 8vo. Pp. xiv + 317. *Price* 6*s.* London: Cassell and Co., Ltd., 1913.

Catalogue of the Mammals of Western Europe in the Collection of the British Museum. By Gerrit S. Miller. Demy 8vo. Pp. xv + 1019. London: The British Museum, 1912.

Catalogue of the Heads and Horns of Indian Big Game, bequeathed by A. O. Hume, C.B., to the British Museum (Natural History). By R. Lydekker, F.R.S. Demy 8vo. Pp. xvi + 45. London: The British Museum, 1913.

Rambles in the North Yorkshire Dales. By J. E. Buckrose. Illustrated. Crown 8vo. Pp. x + 192. *Price* 3*s.* 6*d. net.* London: Mills and Boon, Ltd., 1913.

Social Welfare in New Zealand: The Result of Twenty Years of Progressive Social Legislation, and its Significance for the United States and other Countries. By Hugh H. Lusk. Crown 8vo. Pp. viii + 287. *Price* 6*s. net.* London: William Heinemann, 1913.

Japan's Inheritance: The Country, its People and their Destiny. By E. Bruce Mitford, F.R.G.S. With Twelve Maps and Plans, and Seventy-five Illustrations from Photographs. Demy 8vo. Pp. 384. *Price* 10*s.* 6*d. net.* London: T. Fisher Unwin, 1913.

My Cosmopolitan Year. By the Author of *Mastering Flame.* With nineteen Illustrations. Demy 8vo. Pp. xi + 289. *Price* 10*s.* 6*d. net.* London: Mills and Boon, Ltd., 1913.

Handbook for Travellers in Scotland. Edited by Scott Moncrieff Penney, M.A. Ninth Edition. With Fifty-seven Travelling Maps and Plans. Crown 8vo. Pp. lvi + 539. *Price* 10*s.* 6*d.* London: Edward Stanford, Ltd., 1913.

Wild Animals of Yesterday and To-day. By Frank Finn, B.A. (Oxon), F.Z.S. Illustrated in Colour and Black and White. Demy 8vo. Pp. 382. *Price* 6*s. net.* London: S. W. Partridge and Co., Ltd., 1913.

The Continent of Europe. By Lionel W. Lyde, M.A., F.R.G.S. Demy 8vo. Pp. xv + 446. *Price* 7*s.* 6*d. net.* London: Macmillan and Co., Ltd., 1913.

Camp Fire Yarns of the Lost Legion. By Colonel G. Hamilton-Browne. Demy 8vo. Pp. xi + 301. *Price* 12*s.* 6*d. net.* London: T. Werner Laurie, Ltd., 1913.

Astronomy Simplified. By the Rev. Alex. C. Henderson, B.D., F.R.A.S. With Twelve Engravings, Copious Notes and an Index. Demy 8vo. Pp. 152. *Price* 2*s.* 6*d. net.* London: J. Clarke and Co., 1913.

A Commercial Geography of the British Isles. By Frederick Mort, M.A., B.Sc., F.G.S. With numerous Maps and Diagrams. Demy 8vo. Pp. viii + 160. *Price* 1*s.* Edinburgh: Oliver and Boyd.

The Nature and Origin of Fiords. By J. W. Gregory, F.R.S., D.Sc. With Diagrams and Illustrations. Demy 8vo. Pp. xvi + 542. *Price* 16*s. net. cash.* London: John Murray, 1913.

Histoire de l'Etat Indépendant du Congo. Par Fritz Masoin. 2 Vols. Pp. 382 + 444. *Prix* 8 *fr.* Namur: Picard-Balon, 1913.

A Geography of the British Empire. By W. L. Bunting, M.A., and H. L. Collen, M.A. Medium 8vo. Pp. 159. Cambridge University Press, 1913.

The Holy Land. By Robert Hichens. Crown 8vo. Pp. viii + 311. *Price* 6*s.* London: Hodder and Stoughton, 1913.

Wild Life Across the World. Written and Illustrated by Cherry Kearton.

Introduction by THEODORE ROOSEVELT. Medium 8vo. Pp. xxvii + 286. *Price* 20*s. net.* London: Hodder and Stoughton, 1913.

Luxembourg: The Grand Duchy and its People. By GEORGE RENWICK, F.R.G.S. With Thirty-four Illustrations and a Map. Demy 8vo. Pp. 320. *Price* 10*s.* 6*d. net.* London: T. Fisher Unwin, 1913.

Official Year-Book of the Commonwealth of Australia, 1901-12. No. 6. By G. H. KNIBBS. Melbourne 1913.

Round the British Empire. By ALEX. HILL. With Twenty-four full-page Illustrations. Crown 8vo. Pp. 383. *Price* 2*s.* 6*d. net.* London: Herbert Jenkins, Ltd., 1913.

A Handbook for Travellers in India, Burma and Ceylon. Ninth Edition. With Twenty-nine Maps and Plans. Crown 8vo. Pp. clxviii + 664. *Price* 20*s.* London: John Murray, 1913.

Highways and Byways in the Border. By ANDREW LANG and JOHN LANG. With Illustrations by HUGH THOMSON. Demy 8vo. Pp. xvi + 439. *Price* 5*s. net.* London: Macmillan and Co., Ltd., 1913.

Burma Gazetteers: Meiktila, Kyaukse, Shwebo, Bhamo, Minbu, Upper and Lower Chindwin, Rangoon, Prome, Toungoo, Amherst, Mandalay, Sagaing, and Myingyan Districts. Rangoon, 1913.

Statistical Abstract relating to British India from 1902-3 to 1911-12. Forty-seventh Number. *Price* 1*s.* 3*d.* London, 1913.

Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions, 1912. Vol. ii. *Price* 4*s.* 1*d.* London, 1913.

East India (Trade): Review of the Trade of India in 1911-12 and 1912-13. Price 1*s.* 1*d.* London, 1913.

Statistical Abstract for the United Kingdom in each of the last Fifteen Years, from 1898 to 1912. Price 1*s.* 11*d.* London, 1913.

Report on the Administration of the Territories now included in the Province of Bihar and Orissa, 1911-12. Price 7*s.* 6*d.* Patna, 1913.

Punjab District Gazetteers. Vols. 3, 4, 7, 12, 17, 21, 23, 26, 28, 29, 34, 35, 36. Lahore, 1913.

Annual Report of the Secretary for Mines for Victoria for the Year 1912. Melbourne, 1913.

Diplomatic and Consular Reports.—Trade, etc., of Bavaria, 1912, and part of 1913 (5194); Trade of Bilbao, 1912 (5196); Trade of Muscat, 1912-13 (5198); Trade of Canton, 1912 (5199); Trade, etc., of Chiengmai, 1912 (5200); Trade of Ningpo, 1912 (5201); Trade, etc., of Gothenburg, 1912 (5202); Foreign Trade of Austria-Hungary, 1912 (5205); Trade, etc., of Brindisi, 1912 (5203); Trade of Kermanshah, 1913 (5204); Trade, etc., of New Orleans, 1912 (5206); Trade of Shanghai, 1912 (5207); Trade, etc., of Fiume, 1912 (5208); Trade of Khorasan, 1912-13 (5211); Trade, etc., of Hamburg, 1912 (5212); Trade, etc., of Curacoa, 1912 (5195); Trade of Panama, 1912 (5214); Foreign Trade of China, 1912 (5216); Trade of Nagasaki, 1912 (5209); Trade, etc., of Leghorn, 1912 (5213).

Colonial Reports (Annual).—Gilbert and Ellice Islands Protectorate, 1911 (753); Cayman Islands, 1911-12 (754); Gibraltar, 1912 (755); St. Helena, 1912 (756); Weihaiwei, 1912 (757); Ceylon, 1911-12 (758); Sierra Leone, 1912 (759); Seychelles, 1912 (760); Somaliland, 1912-13 (761); Hong-Kong, 1912 (762); Turks and Caicos Islands, 1912 (763); Falkland Islands, 1912 (764); Northern

Territories of the Gold Coast, 1912 (765) ; Bahamas, 1912-13 (766) ; Gambia, 1912 (767) ; Fiji, 1912 (768).

Colonial Reports (Miscellaneous).—Southern Nigeria, 1911 (85).

Publishers forwarding books for review will greatly oblige by marking the **price** *in clear figures, especially in the case of foreign books.*

NEW MAPS.

EUROPE.

ORDNANCE SURVEY OF SCOTLAND.—The following publications were issued from 1st to 31st August 1913 :—

Two-mile Map, printed in Colours, and hills shown by layers, folded in cover or flat in sheets. Sheets 8, 9, 11. Price—on paper, 1s. 6d. ; mounted on linen, 2s. ; mounted in sections, 2s. 6d. each.

Six-inch and Larger Scale Maps.—Six-inch Maps (Revised). Quarter Sheets, with contours in blue. Price 1s. each. *Lanarkshire.*—24 SW. ; 24 SE. ; 25 NW. ; 30 SE. ; 35 NE.

1 : 2500 Scale Maps (Revised), with houses stippled, and with areas. Price 3s. each. *Lanarkshire.*—Sheets II. 14 ; III. 12 ; XVI. 6. Sheet XVI. 10, price 1s. 6d. *Renfrewshire.*—Sheets XVI. 6, 7, 10, 11, 12 ; XVII. 9, 10, 14. Sheet XVII. 15. Price 1s. 6d.

Note.—There are no coloured editions of these Sheets, and the unrevised impressions have been withdrawn from sale.

Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 3s. each. *Stirlingshire.*—Sheets X. 15 NW., NE. ; 16 NW., SW.

The following publications were issued from 1st to 30th September 1913 :—

Six-inch and Larger Scale Maps.—Six-inch Maps (Revised). Quarter Sheets, with contours in blue. Price 1s. each. *Lanarkshire.*—19 SW ; 20 NW. ; 23 NW. ; 37 SW. With contours in red. Price 1s. each. *Lanarkshire.*—17 SW. ; 18 NE.

1 : 2500 Scale Maps (Revised), with houses stippled, and with areas. Price 3s. each. *Lanarkshire.*—Sheets II. 11 and 7 ; IV. 14 and 10. Sheets II. 8 ; III. 7 ; IV. 9. Price 1s. 6d. each. *Renfrewshire.*—Sheets XVI. 15 ; XVII. 13 ; XVIII. 2, 3.

Note.—There are no coloured editions of these Sheets, and the unrevised impressions have been withdrawn from sale.

Special Enlargements from 1 : 2500 to 1 : 1250 Scale. Prepared for the Land Valuation Department, Inland Revenue. Price 3s. each. *Fifeshire.*—Sheets XXVIII. 9 NW., SW. ; 11 NE., SE. ; 12 NW., SW. ; XXIX. 1 NW., SW. *Stirlingshire.*—Sheets XVII. 4 SW. ; XXVIII. 8 SE. ; 13 NE. ; 14 NW. *Stirlingshire* with *Dumbartonshire (Det.).*—Sheet XXVIII. 12 S.E.

GEOLOGICAL SURVEY OF UNITED KINGDOM.—General Memoir. Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for 1912. Price 1s.

AFRICA.

ADRAR DES IFOGHAS.—(French Sahara) Carte dressée par le Capitaine Cortier et l'Adjutant Malroux. Echelle de 1 : 500,000. Feuilles, No. 1, et No. 2, 1912. Prix 2 francs (each sheet).

Service Géographique des Colonies, Paris.

EAST AFRICA PROTECTORATE.—Scale 1 : 125,000 or about 2 miles to an inch. Sheet—Elgon, Nakuru-Nyeri, Nasin-Gishu. 1913. Price 2s. 6d. each.
Geographical Section, General Staff, London.

DEUTSCH-SÜDWESTAFRIKA.—Karte des Sperrgebiets. Massstab 1 : 100,000. Im Auftrage der Deutschen Diamanten-Gesellschaft, M.B.H., bearbeitet von Paul Sprigade und Dr. U. Lotz. 1913. 10 Blatter. Price M. 8 each sheet.
Dietrich Reimer (Ernst Vohsen), Berlin.

KAMERUN mit **TOGO.**—Massstab 1 : 2,000,000. Bearbeitet von Max Moisel. 1913. Price M. 5. *Dietrich Reimer (Ernst Vohsen), Berlin.*
This is the latest and best general map of the Kamerun Territory.

KAMERUN.—Karte in 31 Blatter und 3 Ansatzstucken im Massstabe von 1 : 300,000, bearbeitet unter Leitung von Max Moisel. Im Auftrage und mit Unterstutzung des Reichs-Kolonialamts. 1913. Blatt E 2, Banjo; Blatt F 2, Fumban; Blatt G 2, Jaunde. Price M. 2 each sheet.
Dietrich Reimer (Ernst Vohsen), Berlin.

SOUTHERN NIGERIA.—Scale 1 : 125,000 or about 2 miles to an inch. Sheets—Ibadan, Igangan, Izangan West, Iebu-Ode, Shaki-West. 1913. Price 1s. 6d. each.
Sold by W. and A. K. Johnston, Limited, Edinburgh and London.

SOUTH AFRICA.—Bartholomew's Reduced Survey Map, coloured to show height of land. Scale 1 : 2,500,000 or 39·4 miles to an inch. With inset plans of Capetown, Port Elizabeth and Durban. New Edition. 1913. Price 3s. mounted on cloth. *John Bartholomew and Co., Edinburgh.*

NORTH AMERICA.

NORTH AMERICA.—General Sketch Map in one sheet. Scale 1 : 10,000,000. Compiled by U.S. Geological Survey. George Otis Smith, Director. 1912.
United States Geological Survey, Washington, D.C.

NORTH AMERICA. INTERNATIONAL MAP.—Scale 1 : 1,000,000 or 15·78 miles to an inch. Sheet North K 19, Boston. Compiled, engraved and published by the U.S. Geological Survey. George Otis Smith, Director. 1912.
United States Geological Survey, Washington, D.C.

We welcome this first contribution from the United States to the International Map of the World. It fully realises the prescribed standard of cartography, both in drawing and execution.

ALBERTA AND SASKATCHEWAN.—Pitner's New Map on Scale of 1 : 1,300,560 or 21 miles to an inch. Compiled by G. W. Bacon and Co., Ltd. 1913. Price 21s. *G. W. Bacon and Co., Ltd., London.*

A clear, up-to-date office reference map on a scale adequate to show all places of importance. Railways, existing and in construction, are distinguished according to different companies. An index to towns and villages is printed on the margin.

MANITOBA, SASKATCHEWAN AND ALBERTA.—Scale 35 miles to an inch. Showing the number of Quarter-Sections available for homestead entry in each Township, also the pre-emption and purchased homestead area as defined by the Dominion Lands Act, 1908. Corrected to May 1913.
Department of the Interior, Ottawa.

UNITED STATES SURVEY.—George Otis Smith, Director.

The figures after the name of each State indicate the number of Sheets received.

Topographic Sheets on Scale of 1 : 12,000 or about 5¼ inches to a mile. Special Scale for Mining Districts Arizona, 2; Colorado, 1; New Mexico, 1.

Topographic Sheets on Scale of 1 : 31,680 or about 2 inches to a mile. California, 18; Louisiana, 2; Mississippi, 4; Texas, 3.

Topographic Sheets on Scale of 1 : 62,500 or about 1 inch to a mile. Arizona, 1; Arkansas, 1; California, 2; Georgia, 1; Illinois, 3; Iowa, 2; Kentucky, 3; Maine, 2; Maryland, 2; Michigan, 2; Minnesota, 3; Missouri, 2; Montana, 4; New York, 8; Ohio, 7; Oregon, 1; Pennsylvania, 3; Tennessee, 1; Washington, 2; West Virginia, 10.

Topographic Sheets on Scale of 1 : 125,000 or about 2 miles to an inch. Arizona, 2; California, 5; Colorado, 1; Montana, 5; New Mexico, 1; Ohio, 1; Tennessee, 1; Wyoming, 2; Yellowstone Park, 1.

Hawaii, Island of Kauai.—Scale 1 : 62,500 or about 1 inch to a mile.

United States Geological Survey, Washington, D.C.

THE HUDSON, MOHAWK GAP.—Contoured Outline Map on scale of 1 : 1,250,000, by B. B. Dickinson. Prepared for London School of Economics.

Sifton, Praed and Co., Ltd., London.

ARCTIC AND ASIA.

ARCTIC REGIONS.—Scale 1 : 6,300,000 or 100 miles to an inch. Projected and drawn by A. Briesemeister, 1912.

American Geographical Society, New York.

The special feature of this map is the introduction of black gores, at every 10° of longitude, which take up the distortion caused by the representation of the spherical surface on a plane.

SPITSBERGEN.—Map of Prince Charles Foreland from Surveys by W. S. Bruce, LL.D., and J. Mathieson, F.R.S.G.S. Scale 1 : 140,000. Surveyed 1906-7-9. Published 1913.

This map is the subject of a special article in this number, pp. 598-9.

HONG KONG, and Part of the Leased Territory of Kowloon. 1913. Scale 2½ inches to a mile. Two sheets. Price 2s. each.

Geographical Section, General Staff, London.

The latest and best map of the Hong Kong Territory, showing full topographical detail, with height of land and depth of sea.

ATLAS.

ATLAS OF COMMERCIAL GEOGRAPHY.—Compiled by Fawcett Allen, Assistant Map Curator, R.G.S., with an Introduction by D. A. Jones, Assistant Librarian R.G.S. Price 3s. 6d. net. *The University Press, Cambridge.*

A series of forty-eight plates of maps, with a general index. The maps illustrate physical, political and economic features, with special reference to Commercial Geography. The Atlas is primarily designed to accompany the *Elementary Commercial Geography*, also issued by the University Press.

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THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

THE BRITISH ANTARCTIC EXPEDITION, 1910-13.[1]

By Commander E. R. G. R. Evans, C.B., R.N.,
Livingstone Medallist of the Royal Scottish Geographical Society.

(*With Maps.*)

So much has been published concerning the British Antarctic Expedition, the tragic loss of its gallant leader and his four brave companions, whose names we know so well, that there is no need to preface the story by telling you at length how Captain Scott made his preparations. His organisation was complete, his equipment splendid, and no expedition ever left our shores with a better outfit or a more enthusiastic and determined personnel. Thanks to Captain Scott's fine organisation our expedition remains self-contained even after his death.

On June 1, 1910, the *Terra Nova* left London with most of the members of the expedition. She finally left New Zealand on November 29. Captain Scott had with him fifty-nine officers, scientists, and seamen. The *Terra Nova* left New Zealand a very full ship; besides four hundred tons of coal she carried provisions for three years, two huts, forty sledges, fur sleeping bags, bales of clothing, all kinds of instruments, and the hundreds of little items of equipment necessary to a Polar expedition with an ambitious scientific programme. Besides these things, which filled our ship's holds and the between deck spaces, we carried nineteen Siberian ponies, thirty-four dogs, three motor sledges, 2500 gallons of petrol, and our paraffin on the upper deck. The animals were under the charge of Mr. Cecil Meares, who with Lieut. Bruce had brought them down from Siberia. The ponies after we left New Zealand were taken charge of by Captain Oates, of the Inniskilling Dragoons.

The first exciting incident on the southward voyage occurred on

[1] An Address delivered before the Society in Edinburgh, Nov. 19, 1913. Reprinted by permission from the *Geographical Journal*.

December 2, when we encountered a gale which, in the deeply laden condition of the ship, nearly caused the loss of the expedition. First the engine-room choked, and then the hand-pumps. Heavy seas washed over the vessel, and fires had to be extinguished as the engine-room was feet deep in water. While the pump suctions were being cleared the after-guard formed a bucket discharge party, and baled the ship out continuously for twenty-four hours. At the end of this time the gale abated, and we proceeded southward, having come through with no loss save two ponies, and one dog which was drowned.

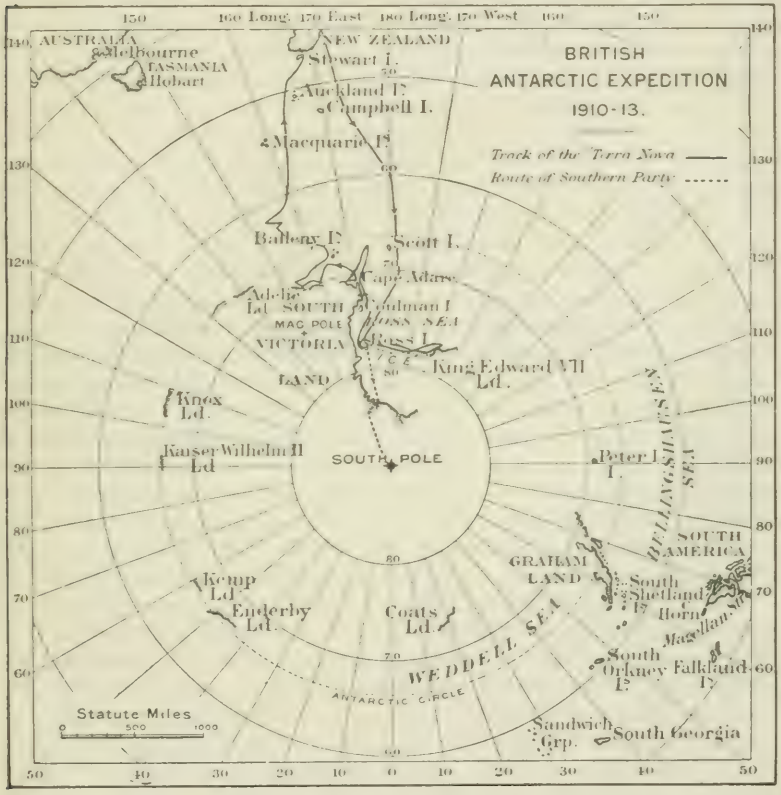
Proceeding south on the meridian of 179° W., the first ice was seen in lat. 64°. The ship passed all kinds of icebergs, from huge tabular to little weathered water-worn bergs. The Antarctic pack was reached on December 9, in lat. 65° S., and the ship boldly pushed through for some 200 miles under steam and sail, when her progress was retarded to such an extent that, to save coal, engines were stopped, sail was furled, and the ship lay under banked fires for some days. We spent three weeks in the pack, and emerged on December 30, after pushing through 380 miles of ice. The time was not wasted: magnetic observations, deep-sea soundings, and serial sea-temperatures were obtained. The zoologists and marine biologists secured valuable specimens. Once in open water we proceeded full speed to Cape Crozier, as Dr. Wilson wished to study the embryology of the Emperor penguins during the winter season. Captain Scott was quite prepared to make Cape Crozier our base, if a suitable landing-place was to be found. As no good place was to be seen, we rounded Cape Bird at midnight, and entered M'Murdo Sound. It was remarkably clear of ice. We passed Shackleton's winter quarters, and noticed his hut at Cape Royds looking quite new and fresh. Six miles further south the ship brought up against the fast ice, which extended right across the Sound.

On January 4, 1911, thirty-six days out from New Zealand, Captain Scott, Wilson, and myself went across the ice and visited a little cape which looked, and subsequently proved to be, an ideal spot for wintering. This place Captain Scott named Cape Evans. Immediately the winter quarters were selected, out came the stores and transport. Lieut. Pennell took charge of the ship, Lieut. Campbell of the transport over the mile and a half of sea-ice; the charge of the base was given to me, while Captain Scott supervised, planned, and improved.

Meares' dogs, Oates' ponies, and Day's motors supplemented by man-hauling parties bustled between ship and shore, transporting stores over the frozen sea. At the cape, Davis, the carpenter, with his willing crew, put up the tent. In less than a week the main party had their equipment ashore.

We will now follow Captain Scott and his companions at the principal base. The weather was so hot when first we landed that the ice melted, and we could wash in fresh water, and even draw our drinking-water from a cascade. We built ice-caves to stow our fresh mutton in, and for magnetic observations. Outside the hut we soon had fine stables. Directly the construction of the base station was assured, away went every available man to lay a depôt. We said good-bye to the ship, and

on January 24, 1911, Captain Scott and eleven companions left with two dog teams and eight ponies to lay out a depôt of foodstuffs before the Antarctic winter set in. Nearly one ton of provisions was taken out to a point 144 miles from our base. This spot was named One Ton Depôt. The party for the return journey was split up into three detachments. Captain Scott with Meares, Wilson, and Cherry Garrard, came home with the dogs. Scott and Meares had the misfortune to run along the snow bridge of a crevasse. The bridge gave way, and all the dogs but



Osman, the leader, and the two rear animals, disappeared down a yawning chasm. With the greatest difficulty the dogs were rescued. Scott and Meares were lowered by Wilson and Cherry Garrard into the crevasse. They found the dogs twisting round, suspended by the harness, fighting, howling, and snapping. One by one they were freed from the trace, and hauled up on to solid ice: as each animal regained safety he lay down and slept. It was an anxious period for all concerned. Captain Scott spoke most highly of Wilson, Meares, and Cherry Garrard's behaviour and resource on this occasion.

One party, consisting of the second in command and two seamen, returned from the depôt journey with the three oldest and weakest

ponies—Blossom, Blucher, and James Pig. The ponies were in very poor condition, and Oates, their master, expected all three to give out on their return march. They were christened by the seamen "The Baltic Fleet." Two of them died owing to the severe weather conditions that obtained at the end of February, but the third pony, James Pig, was a plucky little animal, and he survived. Lieut. Bowers, in charge of the detachment which built up "One Ton Depôt," returned after the other two parties. He had with him Cherry Garrard and Crean, when, on March 1, he was sent across the sea-ice to reach Hut Point. The ponies were tired and listless after their hard journey and in bad condition, and they had to be frequently rested. As they advanced towards Hut Point cracks in the ice became apparent, and when the party reached a crack which showed the ice to be actually on the move, they turned and hastened back—but the ice was drifting out to sea! The ponies behaved splendidly, jumping the ever-widening cracks with extraordinary sagacity. Bowers, Cherry Garrard, and Crean launched the sledges back over the cracks in order not to risk the ponies' legs. Eventually they reached what looked like a safe place. Men and ponies were thoroughly exhausted. Camp was pitched, and the weary party soon fell asleep. Bowers soon awoke, hearing a strange noise. He found the party in a dreadful plight—the ice had again commenced to break up, and they were surrounded by water. One of their four ponies had disappeared in the sea. Camp was again struck, and for five hours this noble little party fought their way over three-quarters of a mile of drifting ice. They never thought of abandoning their charge, realising that Scott's Polar plans might be ruined if four more ponies were lost with their sledges and equipment. Crean, with great gallantry, went for support, clambering with difficulty over the ice. He jumped from floe to floe, and at last climbed up the face of the Barrier from a piece of ice which touched the ice-cliff at the right moment. Cherry Garrard stayed with Bowers at his request, for little Bowers would never give up his charge while a gleam of hope remained. For a whole day these two were afloat, and eventually Captain Scott, Oates, Gran, and Crean appeared on the Barrier edge, and on seeing them Bowers and Cherry Garrard jumped some floes till they reached a piece of ice resting against the Barrier face, thanks to the return of the tide. Bowers and Cherry Garrard were rescued, and after a further piece of manœuvring, a pony and all the sledges were recovered. The other three ponies were drowned. During this trying time Killer whales were about almost continuously, blowing and snorting in the intervening water spaces. Only those who have served in the Antarctic can realise fully what Bowers' party, and also Scott's own rescue party, went through.

By March 4 all the depôt parties were safely, if not comfortably, housed at Hut Point, with the two dog teams and the two remaining ponies. We were unable to return to Cape Evans for six weeks, as the sea would not freeze over properly on account of persistent high winds. We lived in the old hut left by the *Discovery*, and our existence was rather primitive. Meares and Oates perfected a blubber stove. We killed seals, and thus obtained food and fuel. Although rather short of

luxuries, such as sugar, we were never in any great want of good plain food, and the time passed agreeably enough. On March 14, the Depôt party was joined by Griffith Taylor, Debenham, Wright, and Petty-Officer Evans.

Taylor's party had been landed by the *Terra Nova* on January 27, after the start of the Depôt party, to make a geological reconnaissance. They traversed the Ferrar glacier, and then came down a new glacier, which Scott named after Taylor, and descended into Dry Valley, so called because it was entirely free from snow. Their way led over a deep freshwater lake four miles long, which was only surface frozen. This lake was full of algæ. The gravels below—a promising region of limestones, rich in garnets—were washed for gold, but only magnetite was found. When Taylor had thoroughly explored and examined this region, his party retraced their footsteps and proceeded southward to examine the Koettlitz glacier. They returned from the Koettlitz glacier along the edge of the almost impenetrable pinnacle ice, and part of their journey actually led them through an extraordinary and difficult ice-field. It took two days to negotiate 6 miles of this surface: the party were then able to get back on to sea-ice, and without mishap marched to Hut Point. We now numbered sixteen at this congested station, and 15 miles of open water separated us from Cape Evans. The gales were so bad that spray dashed over the hut sometimes, and all round the low-lying parts of the coast spray ridges of ice formed. But at last ice formed which was not blown out, first in little pancakes, which cemented together and formed floes, these in their turn were frozen together, and at last a party of nine made the passage over the new sea-ice to Cape Evans, and, on April 13, 1911, they marched into the hut at our main base, dirty but cheerful. The cook soon had all kinds of luxuries prepared for us. Captain Scott was delighted at the progress made by those left in our hut under Dr. Simpson.

And now that communication was established between Hut Point and Cape Evans, we settled down for the winter. Thanks to Ponting, our photographic artist, we have a magnificent pictorial record of events. Ponting went everywhere with his camera and kinematograph machine. Even when we came South in the ship he kinematographed the bow of the *Terra Nova* breaking the ice. If a sledge-party set out, a penguin appeared, or a pony "played up," or even if a dog broke adrift, Ponting was there with his artillery, ready for action. He even had a galloping carriage with his quick-firing cameras drawn by dogs. He would get seals to pose for him if he wished, by his persuasive methods, or by exciting their curiosity. Ponting never missed an opportunity of making an artistic photograph.

We must now hurry through four months' darkness. The first winter seemed to pass very quickly. Every one was busy at his special subject. Dr. Wilson, the chief of our scientific staff, helped us all. He was our Solomon. To "Uncle Bill" we all went for sound practical advice. Wilson was a friend and companion to Captain Scott, and, indeed, to all in the Expedition.

During the winter months holes were made in the sea-ice through

which we lowered a wire fish-tray. By this means we caught a number of Notothenia. When Atkinson, the helminthologist, had examined these fish, they were handed to the cook who served them up for breakfast. These fish were a great delicacy.

A small hut was erected some 50 yards from the main station to contain the magnetic observatory under Dr. G. C. Simpson of Simla. His place was at the base station; his important work as physicist and meteorologist prevented him from taking an active part in our sledge journeys. When he was recalled to Simla in 1912, his work was ably continued by Wright, the Canadian chemist, who made a special study of ice structure and glaciation.

On June 27 Dr. Wilson, with Bowers and Cherry Garrard, started on a remarkable journey to Cape Crozier. Their object was to observe the incubation of the Emperor penguins at their rookery. During this first Antarctic mid-winter journey the temperatures were seldom above 60°, and they actually fell to 77° below zero, that is 109° of frost. The party took a fortnight to reach Cape Crozier, meeting with good weather —that is, calm weather—but bad surfaces, which handicapped them severely. After rounding Cape Mackay they reached a wind-swept area, and experienced a series of blizzards. Their best light was moonlight, and they were denied this practically by overcast skies. Picture their hardships—frozen bags to sleep in, frozen finneskoe to put their feet in every time they struck camp. They scarcely slept at all. And when they reached Cape Crozier, only about one hundred Emperor penguins could be seen. In the *Discovery* days this rookery was found to contain two or three thousand birds. Possibly the early date accounted for the absence of Emperors. However, half a dozen eggs were collected, and three of these are now in our possession. Wilson on his return told us that he picked up rounded pieces of ice which the stupid birds had been cherishing, fondly imagining they were eggs. The maternal instinct of the penguin is very strong.

At Cape Crozier, Wilson's party had built a stone hut behind a land ridge on the slopes of Mount Terror. This hut was roofed with canvas. The same night that the eggs were collected a terrific storm arose. One of the hurricane gusts of wind swept the roof of the hut away, and for two days the unfortunate party lay in their bags half smothered with fine drifting snow. The second day was Dr. Wilson's birthday. He told me afterwards that had the gale not abated, then they must all three have perished. They dared not stir out of the meagre shelter afforded by their bags. Wilson prayed hard that they might be spared. His prayer was answered; but, as you know, two of this courageous little band lost their lives later on in their eager thirst for scientific knowledge. When the three men crept out of their bags into the dull winter gloom they groped about and searched for their tent, which had blown away from its pitch near the stone hut. By an extraordinary piece of good fortune it was recovered, scarcely damaged, a quarter of a mile away. Wilson, Bowers, and Cherry Garrard started home the next day. They were caught by another blizzard, which imprisoned them in their tent for forty-eight hours. After a very rough march, full of horrible hardships

and discomforts, the little band won through and reached Cape Evans on August 1, having faced the dreadful winter weather conditions on the great barrier for five weeks. Of the three only Cherry Garrard survives. He was Wilson's special friend amongst the younger members. On their return they wanted bread, butter, and jam most, and loaves disappeared with extraordinary speed. They were suffering from want of sleep, but were all right in a few days. A remarkable feature of this journey was the increase of weights due to ice collecting in the sleeping-bags, tent, and clothing. The three sleeping-bags weighed 47 lbs. at the start,

and 118 lbs. on their return. Other weights increased in the same proportion, and their sledge had dragged very heavily in consequence. The three men when they arrived in the hut were almost encased with ice. I well remember undressing poor Wilson in the cubicle he and I shared. His clothes had almost to be cut off him.

From this journey we derived additional experience in the matter of sledging rations. Thanks to the experiments made, we arrived at the most suitable ration. This was for the colder weather expected during the second half of the forthcoming Polar journey. It was to consist of 16 ozs. biscuit, 12 ozs. pemmican, 3 ozs. sugar, 2 ozs. butter, 0·7 oz. tea, 0·6 oz. cocoa—equals 34·4 ozs. food daily. This is one man's food

per day. No one could possibly eat this in a temperate climate; it was a fine filling ration even for the Antarctic. The pemmican consists of beef extract with 60 per cent. pure fat.

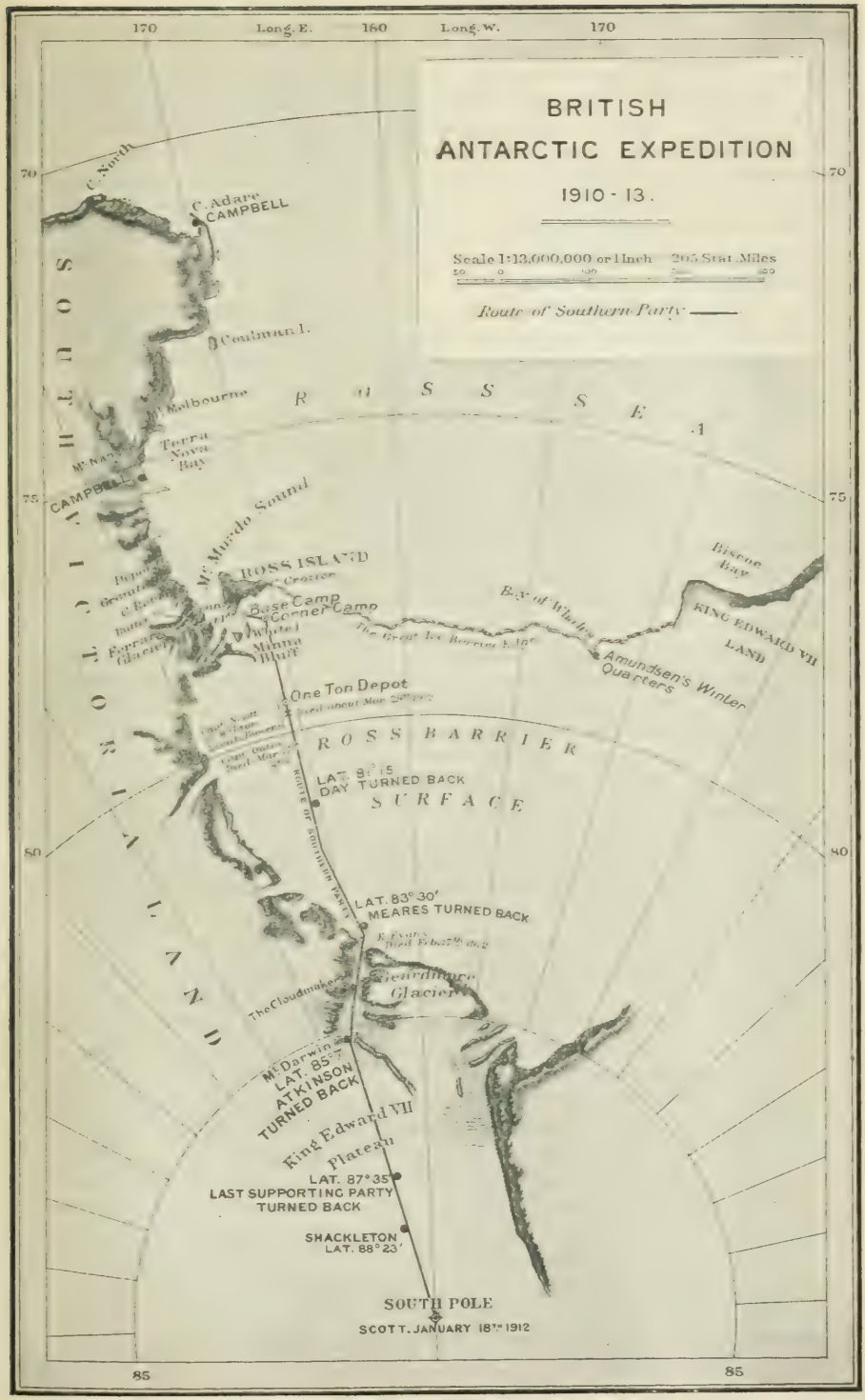
No casualties occurred during the winter, but Dr. Atkinson had a severely frostbitten hand. He had gone out to read a thermometer on the sea-ice 800 yards from our hut. It was blowing and drifting, and Atkinson lost his way in a blizzard. He was adrift for eight hours, but luckily found his way back during a lull in the weather.

During the second half of the winter we were all busy preparing for the sledge expedition to the Pole. Food rations had to be prepared, instruments calibrated, sledges specially fitted to carry the travelling equipment, and our own clothes adapted for sledging according to experience gained in the depôt and winter journeys. Meares and the second in command took parties out and laid depôts during the early spring, and Captain Scott made a coastal journey to the west. These spring journeys were all interesting in their way, but cannot now be dwelt on owing to want of time.

On October 24 the advance guard of the Southern party, consisting of Day, Lashly, Hooper and myself, left with two motor sledges. We had with us three tons of stores, pony food and petrol, carried on six sledges. The object of sending forward such a weight of stores was to save the ponies' legs over the variable sea-ice, which was in some places hummocky, and in others too slippery to stand on. The first 30 miles of Barrier was known to be bad travelling. The motor party had rather trying experiences, owing to the frequent over-heating of the air-cooled engines. Directly the engines became too hot we had to stop, and by the time they were reasonably cooled the carburetter would refuse duty—it had often to be warmed up with a blow-lamp. Day and Lashly, the engineers, had great trouble in starting the motor-sledges. We all four would heave on the spans of the towing-sledges, to ease the starting strain; the engines would generally give a few sniffs, and then stop. It is true that the motors advanced the necessaries for the Southern journey 51 miles, but at the expense of the men who had charge of them. The engineers continually got their fingers frost-bitten tinkering with the engines and replacing big end brasses, which several times gave out. But although the temperatures were low, we were all very happy, and Day was most keen to bring the motors through with credit. They were abandoned a mile south of Corner Camp, but had advanced their weights in turn over rough, slippery and crevassed ice, and thus given the ponies a chance to march light.

The first 30 miles of Barrier surface led over very deep soft snow, and, in fairness to the despised motors, they went better over soft snow than any other part of our transport. The man-hauling party, as we now became, marching for a fortnight, covered nearly 180 miles, and halted at a rendezvous on November 15 in lat. 80° 32′ south. We waited here six days, and built an enormous snow cairn 15 feet high. We called this rendezvous Mount Hooper, after our youngest member.

On November 21, Captain Scott arrived with eleven men, ten ponies and two dog teams. We heard that they had been delayed partly by bad


170
Long. E.
180
Long. W.
170
BRITISH
ANTARCTIC EXPEDITION
1910 - 13.
Scale 1:13,000,000 or 1 Inch 205 Stat. Miles
Route of Southern Party
70
75
80
85
C. North
C. Adare
CAMPBELL
Coulman I.
Melbourne
Mt. Nansen
Terra Nova Bay
CAMPBELL
Mc Murdo Sound
ROSS ISLAND
Base Camp
Corner Camp
Ferrar Glacier
White Island
Minna Bluff
One Ton Depot
The Great Ice Barrier
Bay of Whales
Amundsen's Winter Quarters
Bisco Bay
KING EDWARD VII LAND
ROSS BARRIER
SURFACE
LAT. 82° 15
DAY TURNED BACK
ROUTE OF SOUTHERN PARTY
LAT. 83° 30'
MEARES TURNED BACK
Beardmore Glacier
The Cloudmaker
Mt. Darwin
LAT. 85°
ATKINSON
TURNED BACK
King Edward VII Plateau
LAT. 87° 35
LAST SUPPORTING PARTY
TURNED BACK
SHACKLETON
LAT. 88° 23'
SOUTH POLE
SCOTT. JANUARY 18th 1912

weather, and had purposely kept down the marches to give the weaker animals a chance. However, every one was well and eager to advance southward. Captain Scott ordered us to continue to go forward in advance of the dogs and ponies. We marched exactly 15 miles daily, erecting cairns at certain pre-arranged distances, surveying, navigating, and selecting the camping site. The ponies marching by night were able to rest when the sun was high and the air warmer. Meares' dogs would bring up the rear: they started some hours after the ponies, as their speed was so much greater.

Captain Scott's plans worked easily and well. The ponies pulled splendidly, and their masters vied with each other in their care and management. Oates always kept a very careful look-out on his charges. The tough little beasts pulled about 650 lbs. each, and were fed daily on 10 lbs. of oats and 3 lbs. of oilcake. On camping, large walls would be erected by the pony leaders to shelter their animals from the wind, and while this was being done the cook of each tent would prepare the supper hoosh. We were all so happy and full of life on the march over the great ice barrier that we often would wrestle and skylark at the end of the day. We had our good and bad weather, and we had our turns of snow blindness. This ailment was common to the ponies and dogs as well as to ourselves. Depôts were made every 65 miles. They were marked by big black flags, and we saw one of them, Mount Hooper, 9 miles away. Each depôt contained one week's rations for every returning unit. That outward Barrier march will long be remembered—it was so full of life, health and hope. Our sad days came when the ponies were killed one by one. But hunger soon defeated sentiment, and we used to relish our pony meat, which made the hoosh more solid and satisfactory.

Day and Hooper were the first to return, their places being taken in the man-hauling party by Atkinson and Wright, whose ponies, Jehu and Chinaman, were first shot. With two invalid dogs, Day and Hooper left us at 81° 15′ and marched back to the base. With only two they had great difficulty in pulling their sledge home, so cut it in half and saved themselves considerable labour. On December 4 we arrived within 12 miles of Shackleton's Gap or Southern Gateway. We could see the outflow of the Beardmore glacier stretching away to our left as we advanced southward that day. Hopes ran high, for we still had the dogs and five ponies to help us. Captain Scott expected to camp on the Beardmore itself after the next march. Luck was against us. On December 5 we encountered a blizzard which lasted four whole days. The temperature rose to 35° Fahrenheit, and the drift was very bad indeed. The snow was in big flakes, driving from the SSE., but as the gale took its course snow was succeeded by sleet, and even rain. The Barrier surface was covered with 18 inches of slush. The poor ponies had continually to be dug out from the snowdrifts, which accumulated behind their walls. The dogs suffered less, but they themselves looked like wet rats when Meares and Demitri went to feed them. All our tents, clothing and sleeping-bags were soaked. On December 9 the blizzard was over, and all hands dug out sledges and stores. We wallowed sometimes thigh deep in this Antarctic morass, and after marching for fourteen days on end the remaining five ponies were shot,

as no food was left for them. Poor things! they did their job well, and I believe every pony leader gave half his biscuits to his own animal, so they had some little reward for their last march.

As arranged, three teams of four, pulling 170 lbs. per man, now advanced up the glacier. Meares and his Russian dog-boy came along with us for two marches, and then turned homeward. To help us Meares had travelled further south than his return rations allowed for, and for the 450-mile northward march to Cape Evans he and his companion Demitri went short one meal a day, rather than deplete the depôts. It is a dreadful thing on an Antarctic sledge journey to forfeit a whole meal daily, and Meares' generosity should not be forgotten. The advance of the twelve men up the Beardmore was retarded considerably by the soft wet snow which had accumulated in the lower reaches of the glacier. Panting and sweating, we could only make 4-mile marches until the 15th. But after that the surfaces were better, and we were far less tired in doing more than twice the distances.

On December 16 we reached Blue Ice, 3000 feet above the Barrier, and, with the exception of little delays caused by people falling into crevasses, our progress was not impeded. Wilson did a large amount of sketching on the Beardmore. His sketches, besides being wonderful works of art, helped us very much in our surveys. We had fine weather generally, and with twelve men the Beardmore glacier was overcome without great difficulty. Of course, we had Shackleton's charts, diaries, and experience to help us. We often discussed Shackleton's journey, and were amazed at his fine performance. We always had full rations, which Shackleton's party never enjoyed at this stage. Our marches from December 16 worked up from 13 to 23 miles a day.

On December 21 we were on the plateau in lat. 85° 7′ S., 6800 feet above the Barrier, fit and ready to go forward. Here we established the Upper Glacier depôt. The third supporting party, consisting of Atkinson, Wright, Cherry Garrard, and Keohane, left us the next day, and marched home 584 miles. They spent Christmas Day collecting geological specimens, and reached Cape Evans on January 28, after a strenuous journey of 1164 miles. They had some sickness in the shape of enteritis and scurvy. But Dr. Atkinson's care and medical knowledge brought them through safely.

Captain Scott with his two sledge teams now pushed forward, keeping an average speed of 15 miles a day with full loads of 190 lbs. a man. We steered south-west for the first two days after leaving the Beardmore, to avoid the great pressure ridges and icefalls which were plainly visible to the south. On December 23 we came across enormous crevasses which were as big as Regent Street. They were nearly all well bridged with snow, but we took them at the rush and had no serious falls. The dangerous part is at the edge of the snow bridge, and we frequently fell through up to our armpits, just stepping on to or leaving the bridge. We experienced on this plateau the same tingling southerly wind that Shackleton speaks of, and men's noses were frequently frost-bitten. On Christmas Eve we were 8000 feet above the Barrier, and we imagined we were clear of crevasses and pressure ridges. We now felt

the cold far more, when marching, than we had done on the Beardmore. The wind all the time turned our breath into cakes of ice on our beards. Taking sights when we stopped was a bitterly cold job, fingers had to be bared to work the little theodolite screws, and in the biting wind one's finger-tips soon went. On Christmas Day we marched 17¼ miles, and during the forenoon again crossed a badly crevassed area. Lashly celebrated his forty-fourth birthday by falling into a crevasse 8 feet wide. The laden sledge just bridged the chasm, and poor Lashly was suspended below spinning round with 80 feet of clear space beneath him. We had great difficulty in hauling him up on account of his being directly under the sledge. When he reached the surface, one of the party wished him a happy Christmas and another many happy returns. I will not tell you what Lashly's reply was.

At 7.30 we camped and had our Christmas dinner—extra thick pemmican with pony meat in it, a chocolate and biscuit hoosh, plum pudding, cocoa, ginger, and caramels, and a mug of water each. We were all so full that we could hardly shift our foot-gear, and although the temperature was well below zero, we lay on our sleeping-bags unable to muster the energy to get into them. The 87th parallel was reached on New Year's Eve, after a short march: we made a depôt here, and the seamen of the party converted the 12-foot sledges into 10-foot ones by the spare short runners we had brought along. This took nine hours, but the reduction in bearing surface was worth it. We saw the New Year in that night with a fine feed of pemmican and a stick of chocolate which Bowers had kept for the occasion.

On January 3, Captain Scott came into our tent and told us that he was sure he could reach the Pole if my party gave up one man, and made the homeward journey short-handed. Of course we consented, and Bowers was taken into the Polar party. On January 4 the last supporting party, consisting of Lashly, Crean, and myself, marched south to lat. 87° 34′ with the Polar party, and seeing that they were travelling rapidly, yet easily, we halted, shook hands all round, and said good-bye.

Up to this time no traces of the successful Norwegians had been seen, and we all fondly imagined that our flag would be the first to fly at the South Pole. We gave three huge cheers for the Southern party as they stepped off, and then turned our sledge and commenced our homeward march of nearly 800 miles. We frequently looked back until we saw the last of Captain Scott and his four companions, a tiny black speck on the horizon, and little did we think that we were the last to see them alive, that our three cheers were the last appreciation they would ever know.

The return of the last supporting party nearly ended in disaster. After the first day's homeward march, we found that we could not do the necessary distances in the nine hours, owing to being a man short. This was serious, and in order not to make my seamen companions anxious, that night I handspiked my watch, putting the hands on one hour, so that we therefore turned out about 4 a.m., making from ten to twelve hours a day. On January 8 we were overtaken by a blizzard which

continued for three days. We dared not stop our marches, and thanks to the wind being with us we were able to push on. But the soft snow spoilt the surface, and the outlook was so bad we cut off a big corner and saved two days' march, by shaping course direct for the Upper Glacier depôt under Mount Darwin. This led us over Shackleton's ice-falls at the head of the Beardmore glacier. We descended many hundred feet, mostly riding on the sledge: we had frequent capsizes and broke the bow of the sledge. Crean had the misfortune to catch his trousers somehow in our headlong flight and had them torn to shreds. We reached the Upper Glacier depôt the same day, however, and reclothed Crean, who had left a pair of Mandleberg wind-proof trousers in the depôt cairn with some of his tobacco wrapped up in them.

Returning down the Beardmore, we had some misty weather which hid the land, and we were embarrassed by getting into a mass of ice-falls, pressure ridges, and crevasses. We fell about a great deal, and were two days getting clear. We had no food left, and when we reached the next depôt under Cloudmaker mountain we had marched 17 miles without anything to eat except one biscuit and a mug of tea. To make things worse, I developed scurvy about January 17, when we had 500 miles to go. My condition became daily more serious until I entirely lost the use of my legs. But I could not afford to give up as I was the only one in the party who knew anything about navigation, and I had to keep them marching until they could see Mount Erebus, or some known landmark. When 75 miles from Hut Point I ordered Crean and Lashly to leave me with my sleeping-bag and some food, and go on, sending out relief if possible. They refused to do this, and strapping me on the sledge, dragged me 40 miles in four days, helped by a southerly wind. When 35 miles from Hut Point we had a heavy snowfall, which made it impossible for Lashly and Crean to move the sledge.

Crean then left us on February 19, and marched for eighteen hours with nothing to eat but a few biscuits. He plodded on stolidly through the soft snow, and eventually reached Hut Point utterly exhausted and numbed with cold: but he gave our whereabouts to Dr. Atkinson, who was there with Demitri and the dog-teams, and they came out and rescued us. Lashly undoubtedly saved my life by his careful nursing. It was very brave of him to stay with me, as he only had three meals left, and if relief had not come in time he could never have walked in without food, as he himself was very done after hauling in my sledge-team for over 1500 miles. Crean volunteered to come out again with Atkinson, but was, of course, not allowed to.

And now we will turn again to the Polar party itself. They covered the 145 geographical miles that remained in a fortnight. Captain Scott came across Amundsen's dog-tracks soon after lat. 88°, and followed them to the Polar area. Scott, Wilson, Oates, Bowers, and Seaman Evans reached the South Pole on January 17, 1912. They fixed the exact spot by means of a 4-inch theodolite, and the result of their careful observations located the Pole at a point which only differed from Amundsen's by half a mile, as shown by his flag. This

difference actually meant that the British and Norwegian observers differed by one scale division on the theodolite, which was graduated to half a minute of arc. Experts in navigation and surveying will always look on this splendidly accurate determination as a fine piece of work by our own people as well as by the Norwegian expedition.

Lady Scott has remarked on the magnificent spirit shown by her husband and his four specially selected tent-mates, when they knew that Queen Alexandra's little silk Union Jack had been anticipated by the flag of another nation. Scott and his companions had done their best, and never from one of them came an uncharitable remark. On January 19 the homeward march was commenced; the party had before them a distance of over 900 miles. They came back at a fine pace over the ice-capped plateau. A blizzard stopped them from travelling on January 25, but otherwise their progress was not retarded materially. Seaman Evans was causing anxiety, and his condition naturally worried Captain Scott and his comrades. But, however great their anxieties, they looked after Evans most carefully, and hoped to pull him through. He was rested on the Beardmore glacier, Oates looking after him while the others made a halt for geographical investigation by the Cloudmaker depôt. But Evans also sustained a serious concussion through falling and hitting his head, and then the party were greatly hampered. They were so delayed that the surplus foodstuffs rapidly diminished, and the outlook became serious. Bad weather was encountered, and near the foot of the Beardmore poor Seaman Evans died. He was a man of enormous strength, a tried sledger, and a veteran in Antarctic experience. Captain Scott had the highest opinion of this British seaman. He was the sledge-master, and to Evans we owed the splendid fitting of our travelling equipment, every detail of which came under his charge.

Seaman Evans' death took place on February 17, and then the bereaved little band pushed northward with fine perseverance, although they must have known by their gradually shortening marches that little hope of reaching their winter quarters remained. Their best march on the Barrier was only 9 miles, and in the later stages their marches dropped to 3 miles. The depôts were 65 miles apart, and contained six weeks' provisions; they knew their slow progress was not good enough, but they could not increase their speed over such bad surfaces. The temperatures fell as they advanced, instead of rising as expected, and we find them recording a temperature of $-46{\cdot}2^{\circ}$ one night.

Poor Oates' feet and hands were badly frost-bitten—he constantly appealed to Wilson for advice. What should he do, what could he do? Poor gallant soldier, we thought such worlds of him. Wilson could only answer, "Slog on—just slog on." On March 17, which was Oates' birthday, he walked out to his death in a noble endeavour to save his three comrades beset with hardships, and as our dead leader wrote, "*It was the act of a brave man and an English gentleman.*"

Scott, Wilson, and Bowers fought on until March 21, only doing about 20 miles in the four days, and then they were forced to camp 11 miles south of One Ton Depôt. They were kept here by a blizzard

which was too violent to permit them to move, and on March 25 Captain Scott wrote his great message to the public.

Thanks to Atkinson and the search party we have all the records of these brave men, and so the surviving members of the expedition can work on them, and for Scott's and Wilson's sakes particularly let us hope justice will be done to these same records.

I must now take you right away from the main party to give you an insight into Lieutenant Victor Campbell's work. Campbell's party consisted of Surgeon Levick, Raymond Priestley, geologist, and Seamen Abbott, Browning, and Dickason. Lieutenant Pennell, who now commanded the *Terra Nova*, took this expedition along the Barrier to King Edward's Land in the beginning of February 1911. They got within 10 miles of Cape Colbeck, but the most formidable pack-ice yet seen lay between them and the ice cliffs of this inhospitable looking land. It was out of the question for Campbell to put his hut and gear out on to sea-ice, with no certain prospect of being able to climb the cliffs of King Edward VII. Land. So he and Pennell reluctantly returned to seek a landing elsewhere.

Coal was short, and the season drawing on. The *Terra Nova* steamed back along the face of the Great Ice Barrier, and in the Bay of Whales sighted the *Fram*. The two ships' companies soon made friends, and the commanding officers exchanged calls. Amundsen was anxious for Campbell to winter alongside of him, but Campbell decided to make his winter quarters in another region—it being undesirable to have two expeditions wintering at the same base. Campbell eventually landed at Cape Adare, after vainly searching for a more profitable wintering place. He was most handicapped by the shortage of coal in the *Terra Nova*, which limited the radius of their search.

Campbell and his party did excellent meteorological, geological, and magnetic work, and he himself made some very good surveys. Levick made a special study of the penguins, and Priestley, with his previous Antarctic knowledge, made himself invaluable, apart from his own scientific work. Campbell was loud in his praise of the seamen in this party.

Lieutenant Pennell, in the *Terra Nova*, revisited Cape Adare after the first winter, took off the party and their collections, and landed them again on January 8 at the Terra Nova Bay, to sledge round Mount Melbourne to Wood Bay, and examine this part of Victoria Land. Campbell and his crew returned, after a month's sledge journey to Terra Nova bay, on February 6. They had found garnets and many excellent fossils on this trip. Campbell did some very good work surveying, and has added a good deal to the existing maps.

On February 17, the party began to look for the *Terra Nova*, but as time went on and she did not put in an appearance, Campbell prepared to winter. Pennell, who had brought the *Terra Nova* back to pick this sledge team up, met with ice conditions that were insuperable, and never got within 30 miles of Terra Nova Bay. Pennell, Rennick, and Bruce did all that any men could do to work their ship through, but communication was impossible that season, and so Campbell was left with only four weeks' sledging provisions to face an Antarctic winter. His party

could not have been better chosen to help him through this ordeal. Campbell knew his men absolutely, and they themselves were lucky in having such a resourceful and determined officer in charge.

On March 1 Campbell selected a hard snow slope for their winter home, and into this they cut and burrowed until they had constructed an igloo or snow-house, 13 feet by 9 feet. This they insulated with blocks of snow and seaweed. A trench roofed with sealskins and snow formed the entrance, and at the sides of this passage they had their store-rooms and larder.

All the time this house was under construction a party was employed killing penguins and seals, for which they kept a constant look-out. By March 15 their larder contained 120 penguins and 11 seals. After this date gale succeeded gale, and the winter set in with a long run of bad weather.

Campbell and his companions led a very primitive existence here for six and a half months. They only had their light summer sledging clothes to wear, and these soon became saturated with blubber; their hair and beards grew, and they were soon recognisable only by their voices. Some idea of their discomforts will be gleaned by a description of their diet. Owing to their prospective journey to Cape Evans, Campbell had to first reduce the biscuit supply from eight to two biscuits a day, and then to one.

Generally their diet consisted of one mug of pemmican and seal hoosh and one biscuit for breakfast. Nothing for lunch. One and a half mugs of seal, one biscuit and three-quarters of a pint of thin cocoa for supper. On Sunday, weak tea was substituted for cocoa: this they reboiled for Monday's supper, and they used the dried tea-leaves for tobacco on Tuesday. Their only luxuries were a piece of chocolate and twelve lumps of sugar weekly. They sometimes used tea-leaves and wood shavings for tobacco. They kept twenty-five raisins each for birthdays. One lucky find was thirty-six fish in the stomach of a seal, which, fried in blubber, proved excellent. The biscuit ration had to be stopped entirely from July to September.

The six men cooked their food in sea-water as they had no salt, and seaweed was used as a vegetable. Priestley did not like it, and no wonder, for it had probably rotted in the sun for years, and the penguins had trampled it all down, etc.

Campbell kept a wonderful discipline in his party, and as they were sometimes confined to the igloo for days, Swedish drill was introduced to keep them healthy. A glance at their weather record shows how necessary this was. We find one day snowing hard, next day blowing hard, and the third day blowing and snowing hard, nearly all through the winter. But there was never a complaint. On Sunday divine service was performed. This consisted of Campbell reading a chapter of the Bible, followed by hymns. They had no hymn-book, but Priestley remembered several, while Abbot and Browning and Dickason had all been at some time or other in a choir.

To add to their discomforts, owing to the state of their clothing and meagre food supply, they were very susceptible to frost-bites, and Jack

Frost made havoc with feet, fingers, and faces. Then sickness set in, in the shape of enteritis—Browning suffering dreadfully, but always remaining cheerful. The sickness was undoubtedly due to the meat diet, and its ravages weakened the party sadly.

On May 6 Campbell's party sustained a severe disappointment, for they saw what appeared to be four men coming towards them. Immediately they jumped to the conclusion that the ship had been frozen in and this was a search party. The four figures turned out to be Emperor penguins, and although disappointing in one way they served to replenish the larder, and so had their use.

Campbell and his five companions started for Cape Evans on September 30. Progress was slow and the party weak, but thanks to their grit and to Campbell's splendid leadership, this party all got through to the winter quarters alive. Browning had to be carried on the sledge part of the way, but fortunately they picked up one of Griffith Taylor's depôts, and the biscuit found here quite altered Browning's condition.

It seems a pity that full justice cannot be done to all the parties who went forth sledging in various directions, but a single lecture does not permit very full descriptions. Griffith Taylor, the Australian physiographer, with Debenham, Gran, and Seaman Forde, made a most valuable journey along the coast of Victoria Land for geological and surveying purposes. I hope Taylor will prepare a paper on this expedition at some future date. The work of the *Terra Nova* is also worthy of a special lecture: and here I would like to say that Lieutenant Pennell, her commander, Lieutenants Rennick and Bruce, Mr. Drake and Mr. Lillie, have worked incessantly in the ship and on the less frequented coasts of New Zealand for nearly three years. They have been ably and loyally assisted by the seamen and stokers of the *Terra Nova*—worthy fellows, whose by-word has been, "*Play the game.*"

GEOGRAPHY AT THE BRITISH ASSOCIATION.

THE Birmingham Meeting of the British Association opened on Wednesday, September 10, with the delivery of the presidential address by Sir Oliver Lodge.

The Sections began work on the following morning, Section E being conveniently housed in the Midland Institute, close to the Reception Room. Professor Dickson's presidential address appeared in the October issue. He was followed by Dr. W. S. Bruce, whose paper we published last month (pp. 598-9).

Dr. C. A. Hill then described the exploration of Gaping Gyll, a limestone shaft in the south-eastern flank of Ingleborough, by the members of the Yorkshire Ramblers' Club. During the course of the Survey some interesting facts in regard to underground circulation of water have emerged.

Afterwards Mr. I. N. Dracopoli read a paper on his journey across

Southern Jubaland from the Coast to Mt. Kenia, of which the following abstract was supplied :

The immediate object of this journey was to elucidate the hydrographical problems presented by the disappearance of the river Uaso Nyiro into the Lorian Swamp, and to map as much as possible of the unknown country lying between the latter place and the sea, which had not been previously visited by a white man.

A start was made from Kismayu, behind which, and parallel to the coast, lies a low range of sandhills covered with dense bush, above which stand out numerous conifers (*Juniperus procera*). The general slope of the land is from the north-west towards the south-east. The country consists of a series of broad, shallow valleys almost imperceptible to the eye, for the most part overgrown with dense bush and forest, and running in the same general direction. Down the centre of these valleys there are dry river-beds, mostly sandy and densely covered with jungle. As they draw near the sea these valleys and low, rounded ridges disappear, giving place in the north to a level arid plain, which is bounded on the east by the above-mentioned sandhills. In the south-east the country consists of a densely wooded plateau of slight elevation, drained by the rivers Durnford and Arnolé. Near the coast in the Biskayia district are several mangrove swamps infested with the tsetse-fly. The main watershed in Southern Jubaland is that which divides the valley of the Lak Dera from that of the Guranlagga. The latter stream rises in the district of Kurde and flows almost due east, a very different course from that marked on existing maps. There is an important swamp containing a large amount of water in the district of Gulola. The country in the interior alternates between impenetrable acacia scrub and open park-like glades which afford admirable pasturage for cattle, goats, and sheep, but the districts of Rama Gudi and Arroga are arid in the extreme.

Southern Jubaland is inhabited by the Ogaden section of the Darod Somali, and by a fast-diminishing tribe called the Waboni, who live in a state of semi-slavery The Galla, who originally inhabited the country, have been driven southwards and westwards by the victorious Somali. Of the latter, the most important sub-tribes are the Mohammed Zubheir, the Abd Wak, the Aulehan, the Abdulla, and the Maghábul, of which the latter are the only ones to profess friendship for the white man. Near the coast are found some Herti Somali. The wealth of the Somali consists of vast herds of camels, cattle, goats, and sheep, while they depend for food chiefly on milk and ghee. They are strict Mohammedans of the Shujai sect.

The Lorian district differs in many essential points from Southern Jubaland. The Uaso Nyiro River, which rises in the high tableland to the NW. of Mount Kenia, attains its greatest development near the remarkable volcanic plateau called Marti by the natives. It then gradually diminishes in volume, flowing slowly through gently sloping alluvial plains until, on entering the main Lorian swamp, it is scarcely thirty feet broad and two deep. This swamp is roughly oval in shape, with its long axis NW. and SE., and it is very roughly fifty miles in circumference. Much water is here lost by evaporation and percolation. The river, however, emerges in a still further attenuated form, and flows between high banks for five miles before entering a second and smaller swamp. On emerging once again, it gradually dwindles until permanent water ceases in a series of pools known to the natives as Madolé. There is, however, a distinct stream bed that runs in a shallow valley towards the east until Afmadu is reached, when it turns southwards, finally joining the Juba River by means of the Deshek Wama. In an exceptionally wet season the overflow from the Lorian Swamp runs down this stream bed, which is known as the Lak Dera, and into the sea, by way of the Juba

River. The alluvial plains of the Lorian district are remarkably fertile, and are eminently suited for agriculture.

Friday was devoted to a number of papers of local interest. Miss C. A. Simpson spoke of the Upper Basin of the Warwick Avon, pointing out that as a whole it is a longitudinal river, but very few streams in its basin, above Warwick, are actually strike streams, though there is a line of detached valleys at the foot of the escarpment. The main streams flow obliquely across parallel outcrops of rock, ranging from Inferior Oolites in the SE., through bands of lias and triassic marls, to an inlier of Permian sandstone, which is bounded on the NE. by the Nuneaton coalfield.

The northern and western boundary of the Upper Avon basin crosses the uplands of this formation : and on the south the boundary follows the Oolitic escarpment. On the north-east is a very narrow water-parting between the Avon and the Welland—at a comparatively low level. Within the Avon basin, the two almost equally important valleys of the Upper Avon, and of the Leam continued by Rainsbrook Valley, have defined the plateau on which Rugby stands, and so have further dissected the Great Midland valley.

Above Rugby population is comparatively scanty in the Avon valley, and the country districts are tending to decrease in population.

The Upper Avon basin is crossed by several important lines of communication, mainly from SE. to N. or NW. The Watling Street and the Fosse Way are no longer used as main roads, but, in addition to these, certain main roads cross the district. They run mainly across uplands, in contrast to the railways and canals, which often follow valleys.

Professor W. W. Watts discussed the Geography of Shropshire, and Mr. P. E. Martineau The Midland Plateau and its Influence on the English Settlement of Britain. Professor Watts described the geomorphology and physical features of Shropshire, laying especial stress on the fact that the country is divided into two parts by the Severn, whose course within the county is roughly from north-west to south-east. The two parts differ much from each other, for while the southern is a continuation of the Welsh mountains, the northern, save for a few minor prolongations of the ranges, consists of comparatively flat plains, with marsh lands near the rivers. This difference in relief naturally affects the course of the streams, which are straight and rapid in the south, but tortuous to the north, and has much influence on the lines of communication. This was illustrated by a description of the roads, etc., from Roman times onwards, of the distribution of the population, the sites of the towns and villages, and the chief facts connected with agriculture and industries.

Mr. Martineau said that the Plateau lying between the Severn, Avon, and Trent, was of oval form, and its area was almost exactly 1000 square miles. It was part of the Triassic plain of Middle England, and owed its resistance to denudation, and its consequent elevation above the general level of the plain to a rim of hard rocks by which it is enclosed. The outward escarpment was marked

on the map by the 300-feet and 400-feet contour lines, which were close together. The 500-feet line was generally close by, and on the southern side there were two points over 1000 feet and many of 900 and 800. The south edge of the plateau was thus not only steep, but of considerable height, and was a serious obstacle to travel, as was shown by the Midland Railways Blackwell bank of 1 in 37·5 and the Great Western's Old Hill bank of 1 in 50. During the fifth and sixth centuries the English (or Anglo-Saxon) settlement of Britain was gradually completed, and the southern edge of the plateau marked the meeting of the two main waves of colonists, who might be described for convenience of reference as the Humber (or English) and the Southampton (or Saxon).

Mr. W. H. Foxhall, in discussing the growth and development of Birmingham, said that the early history of Birmingham was somewhat scantily recorded. Situated on the outskirts of Arden Forest, the hamlet lay considerably off the main Roman roads, but a connecting link between Watling Street and the southern part of the Fosse Way was in close proximity. The determination of the town's position was due wholly to geographical conditions, for peninsulas of high ground lay between the valleys of the Tame, the Rea, and the Cole, and in each valley there existed extensive and almost impassable marsh-land which could only be crossed at certain well-defined points, and here ran the ancient ways which connected the towns of the north and west with those of the south and east. The existence of Birmingham was recorded in *Domesday Book*, but it was seldom mentioned in the historical records of the country previous to the time of the Stuarts; yet during that period the place was growing in size and importance. From the surrounding centres of population already established, trackways converged upon this locality, which thus became a centre—a meeting-place for individuals and a market for the exchange of commodities. In the reign of Henry II. the lord of the manor secured rights to establish a market. Small as this was, compared with our present-day idea of a market, it was sufficient to give the place an advantage over other localities; for the possession of a favoured and established market not only attracted traders, but also necessitated the provision of accommodation for those traders and their wares. It was from such small beginnings that the trade and, later, the local manufactures of the town developed. Practically every writer on old Birmingham referred to the town in this twofold aspect. With the development of the coal and iron industry in South Staffordshire the business of Birmingham increased, for, from being the market town, it became also the distributing centre; so that the one expanded in proportion as the development of the other progressed. The construction of canals which radiated from Birmingham, the improvements to the steam engine, followed later by the introduction of railways, gave an impetus to the town's manufactures and to the industries of the Black Country, and further established Birmingham as a trading and distributing centre. The passing of Acts for the improvement of roads, buildings, markets, etc., in the early part of the nineteenth century, marked the beginning of the transformation of Birmingham

from an overgrown market-town into the chief midland commercial centre. Its later progress was due to the industrial skill and inventive genius of its inhabitants, and to that commercial enterprise which had recognised and utilised the advantages that depend on geographical situation.

Mr. Henry Kay contributed a paper on The Black Country and its Borderlands. Its population, he said, approached 1,750,000, and was perhaps denser than that of any area of equal size outside London. The presence of so many people was due to the abundance of valuable minerals near the surface and to the industries which had arisen in consequence. The mineral wealth of the Black Country consisted of unrivalled stores of coal and ironstone, together with limestone, fire-clay, and brick-clay. One seam of coal was ten yards thick. The mines of the central portion were now largely exhausted, or flooded by water, and fresh supplies were being developed east and west. Limestone was got from underground workings at Dudley, the Wren's Nest, and Walsall, and magnificent caverns had been excavated at those places. Fire-clay was obtained from the Stour Valley, and brick-clay was abundant everywhere.

On Monday morning Mr. C. B. Fawcett read a paper on the Expansion of the Fiord Peoples and its Geographical Conditions, taking Norway, the North-west Coast of North America and Magellanes as types. We quote his abstract as follows :

Each of these is a narrow and fragmentary strip of coast backed by barren highland, with only small and scattered patches of lowland. Their climates are all of the same type, wet, cool, and equable, unfavourable to agriculture, but with open sea at all seasons. The peoples depend mainly on the sea for their food and means of communication, and therefore their expansion has been along the waterways.

Each fjord coast is on the mountainous western edge of a continent in high latitudes, but in other respects their positions are very different. Magallanes is at an end of the inhabited earth, with desert coasts to the north, and a wide ocean on all other sides. The NW. Coast is exposed to Asiatic and Polynesian influences, and is less completely shut off from its hinderland than the other fjordlands. The south of Norway borders the "Narrow Seas," and thence had communication with Europe and the Mediterranean.

In each of these lands there has been a mingling of races, but in each the uniformity of the local conditions and the separation from other peoples has made the inhabitants one people in their modes of life. Their relative social development has been mainly influenced by their skill in navigation. This directly determined the range and security of their food supply, and the growth of population and organisation, and therefore the power of expansion. The development of navigation was local, and limited, in Magallanes. On the NW. Coast only dug-out vessels were employed. The Norse ships were influenced by those of Europe and the Mediterranean, and here navigation very early reached a high stage of development.

The expansion of the NW. Amerinds was limited to the region bounded by the mountains and the ocean east and west, the desert, and Arctic coasts south and north. The only practicable route was up the rivers ; and that demanded a

complete change in their mode of life. The limits to expansion from Magallanes were similar, but even narrower.

The Norsemen were not checked by any such barriers, and they spread along three chief routes: 1. NE. to Finmark and the White Sea, (2) westward to Iceland and Greenland, and (3) SW. to the British Isles. The fourth route, to the SE. was blocked by the Danes and Swedes. The form of the expansion in each case was determined by the social condition of the people visited, and the causes of the early success and later rapid decline of the Viking Power are to be found in the state of affairs in Norway and Western Europe at the time and the limited resources of Norway.

After the reading of the paper Professor Myres delivered an interesting speech, in the course of which he referred especially to the social conditions prevailing among fiord peoples.

Dr. W. S. Bruce gave an address on Spitsbergen economically considered, in which he urged that the time had come for Britain to annex Spitsbergen in order to protect the interests of British subjects there. Mr. Alan G. Ogilvie discussed the Physical Geography of the Inverness Firth, in a paper which we shall publish here later. Mr. Ogilvie proposes to continue his work in this region, and received a grant from the funds of the Association for the purpose.

Subsequently Professor J. W. Gregory gave an account, illustrated by a series of very fine lantern slides, of Australia, in view of the British Association's visit to that continent next year.

On Tuesday the Section divided into two parts, one uniting with Section A (Mathematical and Physical Science) to hear various papers connected with Survey work, while the other took part in a discussion on Natural Regions opened by Professor Herbertson, to whom is due the original conception of Natural Regions as applied to geography.

Professor A. J. Herbertson began the proceedings by reading a paper of which the following abstract was supplied:

The idea of Natural Regions is not a new one. It has been used, consciously or unconsciously, by every traveller and geographical student with insight. What we are attempting now, is (i) to divide the World into its Natural Regions, taking into account all the elements composing them, (ii) to recognise and group Natural Regions into different classes and orders, and (iii) to trace the consequences of the recognition of Natural Regions as entities.

I. *The Natural Region.*

It is unnecessary to review the attempts to divide the Earth's surface into zones or regions each possessing some special property—land, water, igneous rocks, little or no rainfall, forests, a roundheaded population, etc. etc. In this raw material the geographer finds certain relations between different elements, certain laws of combination. The elements and the combinations are far more complex than those of organic chemistry, but this complexity is no reason for not applying scientific methods to their investigation, nor for doubting that substantial results can be gained by their use. It is a reason for not consigning the study of Geography to the least experienced, but for giving it

to the man who knows most. The only apology the geographer has to make is not for his subject but for his ignorance.

The Natural Region is a vital unit as well as a physical one, a symbiosis on a vast scale. It is more than an association of plants, or of animals, or of men. It is a symbiotic association of all these, indissolubly bound up with certain structures and forms of the land, possessing a definite water circulation, and subjected to a seasonal climatic rhythm. As each element in a region has its own history, and as each varies in its rate of change, so the evolution of the region is highly complex.

II. *Types and Orders of Natural Regions.*

The advantage of classifying Natural Regions into types is obvious. Some of the larger ones with common morphological or climatic characters have long been recognised, *e.g.*, Mountainous Lands, Plains, Monsoon Lands, Deserts, the Mediterranean Type of Region, etc. The systematic analysis and classification of all types are more recent efforts of geographers, who encounter two difficulties at the outset. One of these is to fix the limit of a Natural region: where does the Sahara begin and the Sudan end? The other is to distinguish properly between different orders or classes of natural regions: are there to be two, or three, or four, or more? For instance, is it sufficient to divide the Monsoon Lands of Asia into great river basins and each of them again into their minor basins, and these again into valleys and plains? Are the classes the same in rainy and rainless lands, in mountains and plains? Can we arrive at any grouping of order of natural regions as little objectionable as the biologist's organism, organ, tissue, cell?

Let us consider some of the simpler natural regions. In the Upper Thames Plain there are belts of *a* flowing water bordered by *b* meadow flood plains, (*c*) land rising above the flood level. Such belts are also found in the valleys of the adjacent Cotswolds; but here all three are more complex, (*a* the flowing water is not confined to the surface but permeates *c* which rises in steep banks above the irregular (*b*) flood plains and forms a gently undulating and sloping surface very different from that of (*c*) in the Plain. Further, while the varieties of (*c*) in the Plain are merely 1 clay and 2 gravel-capped clay, the varieties of (*c*) in the Cotswolds are (*a*) the relatively flat land, (1) very fertile cornbrash, (2) less fertile belts of Oolitic limestone, 3 cappings of gravel, 4 cappings of clay, and (*b* the steep slopes 1 of the valleys, and 2 of the escarpment. There are also considerable differences in climate differentiating the Plain from the Scarped Ridges, and the climatic conditions within the natural region itself vary much more in the hilly region than they do in the plain. The Upper Thames Vale is then clearly a different natural region from the Cotswold Scarped Ridge. There are, however, vales and vales, scarped ridges and scarped ridges. The Upper Thames Vale is a much simpler variety of the same species of natural region than the Vale of Aylesbury, and the chalk-scarped ridges are a variety of the species differing from the oolitic limestone variety.

This grouping according to orographical conditions has its advantages, but others suggest themselves more particularly the division into regions with a common drainage, *e.g.* the basins of Cherwell, Evenlode, Windrush, etc. Probably it is best to combine the two and see in the Cotswolds each incised river-valley as a sub-division of the natural region and the relatively flat land between as another sub-division. In plains the land between the rivers becomes by far the largest and most important sub-division.

We might look on the geological structure as the tissue of a region; but this

geological structure does not suffice for a complete natural region. The water circulation must also be taken into account and the surface forms it has carved. In a mountainous area the valleys seem the natural units, divided by crests; in the plains the land between the rivers is the dominant element, and the rivers divide the natural regions. There are many intermediate forms between these extremes of mountain and plain, of which the Cotswolds are a good example.

Individual valleys, plateaus, and plains form simple geographical units.[1] Groups of different varieties of one or more of these constitute a new and more complex geographical order. These in their turn may be combined to form something more complex, such as the English Scarplands, the West Highlands, etc. Yet more complex are associations of different natural regions such as form the British Isles or Iberia or Scandinavia.

There are therefore various orders of natural region, which we may roughly compare with the species, genera, orders, etc., of the biologist. For these we may have no definite names. Tentatively we may speak of species, genera, orders, classes of natural regions, even though this suggests biological analogies, which may mislead the beginner. From this point of view valley, plain, and plateau are chorographical species each with many varieties. These themselves may be grouped into different genera of mountainous-, plateau-, and plain-lands, and these again into different orders of country, compounded of different combinations of these, which finally grouped together compose the continents.

This morphological or topographical classification is not enough. Climate must be taken into account in the larger divisions. The need for this is most easily recognised in the vast plains, where vegetation affords an index of climatic and edaphic influence. The botanist's classification into plant societies, associations and formations suggests new groupings, which have to be considered in making natural regions.

Beginning with the continents we might recognise major natural regions, each with its own climate rhythm, and this acting on different genera of land forms. These topographical genera enable us to determine the geographical genera, which may themselves be sub-divided into different geographical species, each of which may have a number of varieties.

I venture to suggest as a convenient nomenclature for the geographical natural regions that we should consider each continent as composed of countries containing different regions divisible into districts each with its various localities or neighbourhoods. This would not interfere with such political terms as empire, state, province, county and parish.

Some of the attempts to divide the world into natural regions will be reviewed, if time permits.

Hitherto nothing has been said about Man. The different natural regions exist, whether he is part of them or not. Even in the most complex class, the continent, he may not live at all, *e.g.* in Antarctica. In some natural regions he counts for no more than other animals. In others he has so profoundly altered the surface that it is necessary to consider him and his works in any classification. This is not merely the case in such districts as the Fens or the Lancashire coalfield, but even in such complex countries as China or those which border the Norland Seas of Europe, where much of the original forest has been converted into cultivated land. The concentration of man in the cities obviously alters a locality.

[1] One other class—the cone, usually volcanic—may be mentioned. Only rainy regions are considered for the moment.

We must also differentiate between two natural regions originally of the same type, in one of which man has settled in farms, villages and towns and added a new characteristic to it; and we must also distinguish between a natural region in its present condition from the same region in an earlier state when man did not play the part in it that he does at present, *e.g.* Egypt or Mesopotamia, for we have also to consider reversion.

Men in the natural region may be compared with nerve-cells in an animal. Some have a highly developed, others a very simple undifferentiated nervous (social) system.

III. *The Significance of Natural Regions.*

There are many important consequences which cannot be examined in detail now. It is, however, desirable to point out that while it is possible to study men in families, races, etc., without taking into account that they form but a part of a more comprehensive entity, to do so is to deal with less than the whole problem. It does not suffice to give once and for all a brief description of the physical conditions of a country as a prelude to the account of the history of its inhabitants. The history is incomplete which does not consider both together at all stages. Neither is passive, neither remains unchanged when man becomes important enough to have a recorded history. The changes are not usually sharp and dramatic as in the American Prairies or in South Wales, but slow and subtle as in most countries of Europe. We are accustomed to think of the changes in the men, we rarely consider the changes in the region, which are also of vital significance.

The entity higher than the individual is not the family nor the race, nor any association of men alone, but the more complex association of the Natural Region. This has always been so, and until we recognise the fact neither the history of man nor his relation to the universe, nor even his very pressing present problems, economic or political, can be properly understood. This is much too vast a subject to examine in detail on the present occasion; but I should like to add a note of warning to those who imagine that any such conclusions do more than show that the problems of the universe are somewhat more complex than is commonly supposed. It is not meant that the geographer can solve them; only that they cannot be solved without taking these geographical considerations into account.

The discussion was taken part in by Mr. Geo. G. Chisholm, Dr. M. I. Newbigin, Rev. W. J. Barton, Mr. Alan Ogilvie and others, but was felt on the whole to be a little disappointing. The audience was small throughout, and there was a lack of definiteness in the terms used, which was felt by many to keep the discussion in the air rather than on firm ground.

After the discussion Professor Herbertson showed, on behalf of Mr. W. G. Kendrew, a series of slides illustrating the rainfall of China, and incorporating a mass of material collected and arranged by Father Louis Froc. This new material has rendered necessary some modifications in the conclusions previously arrived at in regard to the seasonal precipitation.

While one half of the Section was thus engaged, another part was listening to the following papers in the joint meeting with Section A. Captain Winterbotham discussed the Accuracy of the Principal Triangulation of the United Kingdom, in a paper in which he described some

recent measurements undertaken in the Lossiemouth region, with the object of determining whether any considerable error was present. The results of these measurements have been very satisfactory, and a full report will be published by the Ordnance Survey. Captain Lyons then spoke on the need of a more precise terminology in Higher Surveying, and two papers on Survey Work in Egypt were communicated.

Two Reports of Committees were presented, one on Geographical Teaching in Scotland, which we published in our last issue, and another on School Atlases. In connection with the latter committee a short address was given by Colonel Close in the Committee Room on Monday, followed by a discussion, and an exhibition of foreign school atlases was also arranged by Dr. Herbertson. The School Atlas Committee asked for re-appointment, and also for a grant to prepare specimen sheets of maps. The draft report and the discussion both showed not only that improvement in school atlases is highly desirable, but that many difficult questions of detail arise in connection with cost, and so forth. The final report of the Committee will be looked forward to with interest.

The meeting as a whole was a great success, and was largely attended. Next year the Association is to visit Australia, as has been already announced here.

THE GEOGRAPHY OF THE ATLANTIC OCEAN.[1]

(With Illustrations.)

This is a very fine book, full of varied learning, and written with singular grace and skill. Dr. Schott has tried to write for the traveller, for the scientific student of geography, and not least for the mariner, whether on his hurried passage across the great Atlantic ferry, or on his long voyage out and home from the Pacific, aboard of some splendid full-rigged ship, relic of the old fleets of sail. He has indeed found the art of weaving together the knowledge of sailor, of student, of trader, of man of the world; of describing complicated things with simplicity and ease; of pressing much learning into little space: of giving us, in short, within this small and modest volume, a comprehensive and adequate account of the great ocean with which it deals.

In his first chapter, Dr. Schott gives us a brief review of the older and the newer history of Atlantic exploration. Passing quickly over the old voyages of priest and viking, of which Nansen tells us so much, he reminds us that Columbus did not sail from Cadiz into an utterly unknown sea: the Canaries had been visited two hundred years before

[1] *Geographie des Atlantischen Ozeans.* Von Dr. Gerhard Schott. 28 Charts and 90 Text-figures. Hamburg: C. Boysen, 1912. *Price* 23 *M.*

We are indebted to the publishers for the loan of the three blocks used in illustrating this article.—Ed. *S.G.M.*

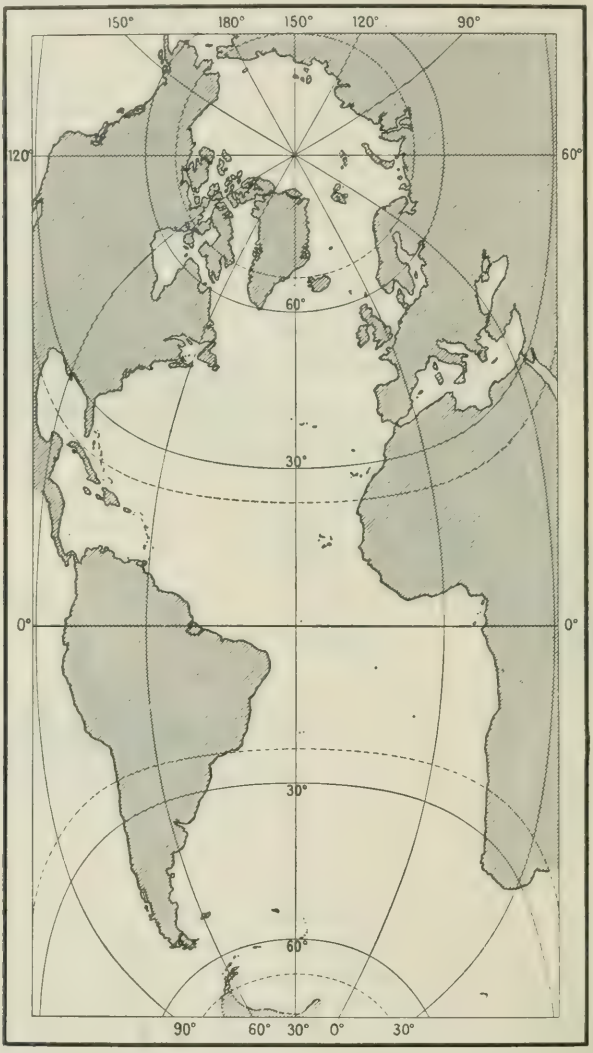
his day, and for a hundred and fifty years, not only those islands, but also Madeira, and even the Azores, had been embodied in the geographical knowledge of the age. Among the many old maps which Dr. Schott reproduces, are Wagner's restoration of the lost chart of Toscanelli (1474), which shows "Antilia" and "Zipangu," lying in a western ocean, on whose farther side was far "Cathay": the first chart of America (1500) by Juan de la Cosa, the Basque, Columbus's fellow-navigator: and the wonderful Atlantic chart of 1529, by Diego Ribero, in which, just thirty-six years after Columbus's first home-coming, we find well depicted the whole Atlantic coastline, from Norway to the Promontorium Bonae Spei, from

Benjamin Franklin's Map of the Gulf Stream.

Labrador to the Tiera de Fernañ de Magellães. Dr. Schott adds an instructive chart showing the routes of the great navigators of the fifteenth and sixteenth centuries, and the stretches of Atlantic coastline which the several great exploring nations had contributed to the map.

Next, Dr. Schott traces out for us the growth of knowledge from the sixteenth century onwards, as it is shown forth in the spirit and the work of the mariner and of the scientific geographer. This "dualism," as Dr. Schott calls it, is already apparent when we compare, for instance, Juan de la Cosa's chart of 1500 with the great geographer Ortelius' map of 1570: and so, through the succeeding centuries, the same two streams of work and thought flowed on, until at last Maury drew them together in his monumental book: for it was he who showed first, as Dr. Schott now shows us again, how much the seaman has to gain from the

theoretical knowledge of the oceanographer. Here, then, we have shown us the first chart of Atlantic currents, drawn by that strange old Encyclopaedist of the Jesuits, Athanasius Kircher, in 1678; Halley's



The Atlantic Ocean from Bering Strait to the Antarctic Region; Lambert's Equivalent Cylindrical Projection 1:160,000,000. (*After a Map by M. Grolls.*)

first chart of the North Atlantic winds, published ten years later; and Benjamin Franklin's Gulf-stream chart of 1770. And so we come to Maury, to that "new chapter," the chapter of Marine Meteorology, which he "opened in the volume of Nature," and on which are based

those great epitomes of meteorological and hydrographical knowledge which constitute the "Sailing Directions" for the sea-faring peoples of the world. Dr. Schott's sketch of historical geography closes with an account of the great exploring expeditions of our own and the last generation, beginning with that of the *Challenger*, the value of which is "unsurpassed even to the present day."

The next brief chapter is wholly geographical. Among its contents may be mentioned an interesting series of charts of the Atlantic, drawn under various projections, and a reproduction of a curious map by Jean de Windt, showing the zones of distance from the nearest land. Here we see that only one small spot of ocean, half-way between the Bermudas and the Cape Verdes, lies as much as 2000 kilometres, or say 1200 miles, from adjacent land.

We pass to a geological chapter, full of interesting matter, where Dr. Schott describes the various speculations of Frech, Neumayr and others, as to the probable extent and contour of the Atlantic, so far back as Carboniferous and Jurassic times. We come much nearer to the region of certainty in the Pliocene period, when the Wyville Thomson ridge extended its great solid barrier from the Scottish coast to Greenland, and isolated from the tempering warmth of the Atlantic a great Arctic sea. The great changes within historic times upon the Dutch and North German coasts are here also touched upon. And lastly, a comprehensive chart shows, for the whole Atlantic coastline, the extensive regions where the land is known to be gaining on the sea, and the comparatively scanty portions in the North Sea, and in the Eastern United States, where the continental level is apparently sinking, and where the sea gains upon the land.

The next three chapters deal with the soundings of the Atlantic basin, with the physical properties, colour, temperature, and salinity of its waters, and with the various climates and other meteorological phenomena. In the first of these chapters we find a capital chart, based on the work of Sir John Murray and of Dr. E. Philippi, of the bottom deposits of the Atlantic, showing the wide distribution of Globigerina ooze over the whole basin, the manner in which it extends far northward with the branches of the warm "Gulf-stream," the curiously local patches of Pteropod ooze, and the great extent of the central patches of Red Clay. The Telegraph Plateau is carefully described; and a very ingenious illustration shows us a great modern ocean liner, in relation first to the shallow waters of the North Sea, whose depth is but a fraction of the vessel's length: again to the depth of the English Channel, which scarcely equals it; and lastly to the depths of the Atlantic, which after all, at least on the passage to New York, are only equal to some twenty times the depth of the vessel. The Atlantic is very deep, but a great ship floating on its surface is (comparing the length of the one with the depth of the other) very much like a cork floating in a wash-tub. Here also Dr. Schott gives us a picturesque account of the Atlantic banks and islands, and showing us, by the way, a view of Rockall, reminds us that this is but a tiny rock, a few hundred square yards in surface, but that it is the sole visible peak

of an immense bank, some 2500 square miles of which are within about 100 fathoms depth.

Dr. Schott, as he has already shown us in the reports of the Valdivia Expedition, is a past-master in the art of drawing hydrographical charts: and we have in this book a whole series of admirable coloured maps, in which are set forth the distribution of the various tints of blue and green in the surface waters of the ocean, and of its temperature, salinity, and density. Furthermore, we are shown charts of the air-temperatures, both mean and seasonal, of the difference between air and water temperature, of barometric pressures and of winds, of cloud and fog, of rainfall, and of the course of the great ocean-currents. Were it for these charts alone, we should be heartily grateful for the book.

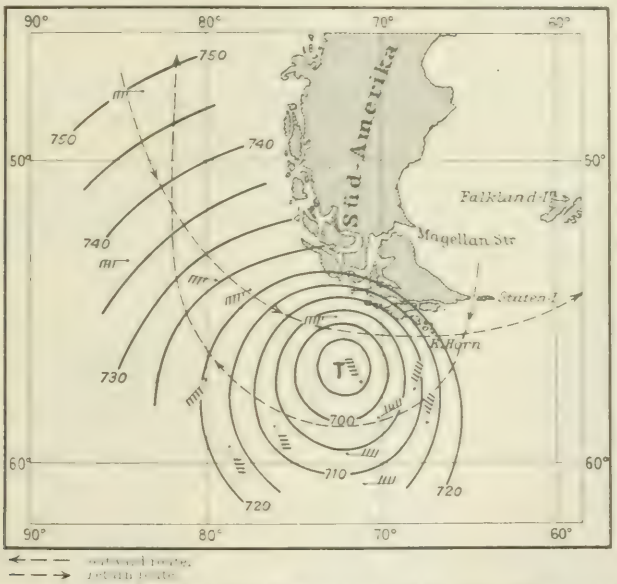
One interesting diagram shows the barograph records of a swift mail-steamer out and home from New York, in stormy weather. On the outward passage the barograph shows a succession of strong maxima and minima: on the homeward route the curve is smooth and all but level. For the ship had been running against the track of the barometric minima in the one case, and had been keeping pace with them on the other.

A chapter follows on the natural history of the ocean, dealing mainly with the distribution of its birds and fishes, its seals and whales. In one chart the range and habitat of the sea-birds is shown, for instance the southern limits of the eider and the auks and guillemots, the range of the commoner gulls, the limits of the penguins, the albatross and the frigate birds. In another chart we have the great northern fisheries of herring, cod and sardine, the summer and winter limits of the flying fish, the mid-Atlantic breeding places of the eel, the boundaries of the Sargasso Sea, and the distribution of coral reefs in the West Indian and Brazilian regions. A third chart, based on the work of Dr. J. Hjort and Mr. A. H. Clark, shows us the distribution of the seals and walrus, the fur seals and the whales. A naturalist may be inclined to carp a little at a few statements and some omissions in this chapter. For instance, Dr. Guldberg's papers on the migrations of the various whales might well have been referred to. The steady catch of sperm-whales, in not inconsiderable numbers, by the Scoto-Norwegian whale-fishers off Rockall and still nearer to the Scottish coast, shows the statement to be inaccurate that the northern limit of that species lies "with very rare exceptions" in 40° N. lat.

The last chapter of the book deals with the commercial geography of the Atlantic, the trade-routes of steamship and sailing ship, the submarine cable-lines, and briefly and finally the network of wireless telegraphy. As we might expect and count upon from a member of the Deutsche Seewarte, where so much care is taken to help and instruct the captains of the German Mercantile Marine, this chapter is admirably done, and in particular that section of it which deals with the courses of the great sailing ships. Dr. Schott reminds us that, narrowed as is the field for these fine vessels, they still play an important part especially in France and Germany, and especially in the transport of wheat and nitre from the Pacific Coast. But few and narrow are the ocean-tracks

on which nowadays the sailing ship is found, and her last great highway is that old one round the Horn. Dr. Schott gives us a striking diagram to show how, and why, captains outward-bound now give a wide berth to the Horn, taking a far southerly course into seas that were feared and avoided a generation ago: the simple reason being that the great cyclonic systems are constantly passing to the southward of the Horn, where their direction of rotation is clock-wise, or the opposite of that in the Northern hemisphere. So it is on their far southern border that the skipper hopes to sail westward: to come home again, still with a favouring wind, close under the Horn, just where the older mariners, outward bound and beating to the westward, fought for days and weeks against the baffling westerly winds (see figure below).

A pair of charts is then given to show, by means of contour lines or "isochrones," the mean number of days spent by sailing ships on their



Pressure and wind in the Cape Horn Region, on April 21, 1896. The arrows show the mean direction of sailing-ship courses on the outward and return journey.

outward and homeward passage between the Lizard and distant parts of the world. The curious fact appears that the homeward passage is on the average considerably the longer, the difference amounting to about five days, or say eight per cent., in a voyage to the Cape of Good Hope or Cape Horn. While indicating some meteorological reasons connected with this discrepancy, Dr. Schott does not let us forget that the greater part of the difference is to be accounted for by the simple fact that the ship goes out clean and comes home foul. The chart of sailing-routes is full of interest. One must not only know something of Great-circle Sailing, but a good deal of the inner mysteries of Meteorology, if one

is to comprehend the many curious facts which it reveals. Only then may one hope to understand, for instance, why two ships, bound for the Horn and for Cape Town, should begin by keeping the same course all the way to the neighbourhood of Pernambuco or Bahia.

But we must take leave of this most instructive and delightful book. The great shipping firms of Hamburg, as the author tells us, have contributed generously towards its publication, and in so doing they have given yet another proof of the sympathy between commerce and learning in that great Free City of Trade. We feel most heartily that the book does credit not only to its author, but also to the great Institute, the Deutsche Seewarte, to which he has the honour to belong.

D'Arcy W. Thompson.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

At a meeting of Council held on Tuesday, 18th November, the following ladies and gentlemen were elected Ordinary Members of the Society :—

The Rt. Hon. Lord Ruthven.
David M. Thomson, South Nigeria.
Sir Alex. Lyon, Aberdeen.
Charles D. Gairdner.
Robert Goudie.
Thomas Wilson.
James Kay Small.
Thomas C. Bramah.
Donald Macdonald.
Mrs. Margaret Cathcart.
Rev. John Martin.
James A. Aikman.
Harvey M. Anthony.
Joseph G. M. Bannerman.
Miss I. W. Cree.
Miss E. P. Hogg.
J. M. Anderson.
Miss Louise Buchanan.
James Ross.
Peter Howie, M.B., C.M.
Alexander Anderson.
John Boyd, Jr., C.A.
William Arnot.
A. W. M. Beveridge.
Miss Sarah A. Cowan.
Miss J. E. Gray-Buchanan.
John Tait.
Samuel R. Skilling, M.A.
James Adam.
C. P. Ross.
Admiral A. W. Chisholm Batten, M.V.O.
W. J. Watson, LL.D.
Robert Abernethy, M.D., F.R.C.P.E.
William Cowan, W.S.
Arthur H. H. Sinclair, M.D., F.R.C.P.E.
Mrs. W. M. Smith.
Mrs. Wm. Gibson.
Miss S. M'L. M'Vean.
Robert R. Mathers, M.D.
Mrs. Greig.
P. Neill Fraser.
Mrs. E. M. Strang.
James Shaw Nowery.
John Stewart.
C. Weddall Holroyd.
Miss M. Boog.
Miss C. K. Wilkie.
George Dickson.
Robert F. Alexander.
William Menelaws.
Miss Mary Dakers.
C. D. Geddes, M.Inst. C.E.
J. Dall, M.A.
Wm. F. Scrimgeour.
Charles C. Duncan.
Gibson C. Ferrier.
Mrs. Gibson C. Ferrier.
William Parker.
J. Noel Johnston.
James Milne, J.P.
W. Leslie Mackenzie, M.D., D.P.H., F.R.C.P.E., LL.D.
James B. Goold.
Thomas E. Watson.
Mrs. Donald.
G. M. Wood, W.S.
Alexander M'Dougall, M.A., B.Sc.
Miss A. Taylor.
Miss Gladys M. Younger.
Thomas Wilson, Jr.
James W. Telford.
James Tuke.
Mrs. Bailey-Duncan.
Thomas Law.
John S. Galbraith, B.L., J.P.
Miss Grace Ramsay.
Joseph Williams.
Mrs. Albert Harvey.
R. C. Greig.
Miss Janet Fraser.
W. L. Pattullo.
W. Frain.
John Nicoll.
Frederick Thomson, J.P.
John Rose.
G. Andrew, M.A., F.R.S.E.
J. A. Briggs.
David Hyne.
G. F. Whyte, M.B., C.M.
James Ross.
W. B. Dickie, Solicitor.
James Young, W.S.
Andrew Dunlop.
Miss E. M. Edwards.
Harry G. Crowden, M.A.
Mrs. J. G. Christie.
J. F. Flint.
J. B. Clark.
A. C. Halley.
Charles Parker.
T. L. Miller.
Edward Cowan.
Robert C. Thomson.
William Henry.
Rev. Alexander Macdonald, M.A., B.D.
J. C. Robertson, C.A.
George Bonar.
John Anderson.
John M. Nairn.
Prof. J. Cossar Ewart, M.D., F.R.S.E.
Edwin A. Watson.
K. Johnston, M.B., C.M.
William Kinnear, M.D.
J. Ernest Cox.
James E. Erskine.

W. Clarke Read.
J. C. Thompson, B.L.
William Gibson.
William Byers, M.A.
Andrew F. Donald.
R. W. Pentland.
Miss E. M. S. Jackson.
John Y. Braidwood.
Miss M. S. Brodie.
J. N. Ferguson.
O. A. C. Alexander.
Miss Annie B. Crow.
J. C. Robertson, J.P.
A. J. Brown.
J. P. Cuthbert.
Alexander Gilroy.
J. F. Anderson.
William J. Brown.
Norman Anderson, M.D., C.M.
John Murray, M.A.
Douglas D. Taylor.
D. K. Symington.
Mrs. J. M. Bell.
Alexander Guthrie.
George Ure Thomson.
George C. Spence.
Charles Corsar.
A. M. Henderson.
Mrs. Richardson.
Albert O. Knoblauch.
Robert W. Bow.
Charles Ogilvy.
John Corrie.
J. G. Gerrard.
W. M. Anderson.
John Macdonald.

The following were elected "Teacher Associate" Members.

Miss M. S. Cormack.
Miss Helen Littlejohn.
Miss Helen Clark.
Miss Chrissy Gray.
Miss Margaret M. Clark.
Miss G. A. Polgreen.
Miss Charlotte Buchan.
Miss J. R. Stewart.
Miss Janet M. Rae.
Miss E. J. Lindsay.
William P. Reid.
Miss Annie H. Dickie.
Miss Margaret R. Cruden.
Miss J. P. Morrison.
R. M. Munro, M.A.
Miss Ann A. Rae.
Miss H. A. Hamilton.
Miss Margaret Hay.
Miss E. Crawford.
Miss J. Crawford.
Miss C. R. Allan.
John Andrew.
Miss Jean Ferguson.
Miss M. B. Wilson.
Miss H. J. Kinghorn.
Miss E. G. Young.
Miss A. Serymgeour.
John Thomson.
Miss A. H. Watson.
Miss A. Tait Sloan.
Miss A. B. Irving.
John S. Gilchrist, F.E.I.S.
William Baird, M.A.
William Lee, M.A.
Miss Kate Fraser.
Miss Annie Kinloch.
Miss Margaret Johnston.
Miss I. M. Ruxton.
Miss I. Lambert.
Miss C. C. Ritchie.
Miss E. Jenkins.
Miss R. M. H. Hutton.
Miss I. Donald.
Miss M. T. M'Kissock.
Miss Jeanie Ferguson.
Miss E. E. Fletcher.
Miss E. S. Hamilton.
Thomas Duncan, M.A.
James B. Richardson.
James Gall, M.A.
Miss M. MacKail.
E. Wakefield.
Miss M. W. Crear.
Miss J. I. Cochrane.
Miss E. M. Pinnett.
Miss I. L. Morrison.
William S. Anderson
H. F. Hunter.
Miss M. M. H. Cram.
Miss N. P. Hogarth.
Miss M. R. Smith.

Diploma of Fellowship.

The ordinary Diploma of Fellowship was conferred on David M. Thomson, Northern Nigeria; J. K. Small, Loanhead; Charles Ogilvy, Edinburgh; and Miss G. H. Picken, Glasgow, subject to the prescribed conditions being complied with.

Dr. W. S. Bruce.

Dr. W. S. Bruce, Leader of the Scottish National Antarctic Expedition, 1902-4, was made an Honorary Life Member of the Society.

The Annual Business Meeting.

The Annual Business Meeting was held on the 18th November in the Society's Hall, the Rt. Hon. the Earl of Stair, President of the Society, being in the Chair.

The Council of the Society submitted its report for session 1912-1913, the twenty-ninth session of the Society. This Report appears on pp. 672-674.

On the motion of Mr. H. M. Rush, seconded by Mr. D. MacRitchie, the report was adopted.

The list of office-bearers recommended by the Council for election for the current session was also submitted to the meeting, and on the

motion of Mr. T. Clendinnen, seconded by Mr. W. Lee, the gentlemen recommended were duly elected.

The following are the appointments so made :—

The Rt. Hon. the Earl of Stair was re-appointed President. Dr. Paul Rottenburg, Glasgow, and Dr. James Burgess, C.I.E., were elected Vice-Presidents.

The Very Rev. G. Adam Smith, D.D., LL.D., Principal of Aberdeen University, was elected Chairman of the Aberdeen Centre.

Mr. J. C. Buist was elected Chairman of the Dundee Centre.

The following members of Council who retire by rotation were re-elected :—W. B. Blaikie, LL.D. ; H. B. Finlay ; D. F. Lowe, LL.D. ; H. M. Cadell, B.Sc. ; Major-General P. C. Dalmahoy ; Colonel T. Cadell, V.C. ; Sir James A. Russell, LL.D. ; William B. Wilson, W.S. (Edinburgh).

The following members of the Society were elected to fill vacancies on the Council :—James Cornwall, John Harrison, Charles E. Price, M.P., and W. J. Watson, LL.D. (*Edinburgh*) ; M. Pearce Campbell (*Glasgow*) ; J. Bentley Philip, M.A. (*Aberdeen*) ; R. Polack, LL.D. (*Dundee*).

Lectures in December.

Mr. F. W. Christian, B.A. (Oxon.), will lecture before the Aberdeen, Dundee, Glasgow, and Edinburgh Centres on the 2nd, 3rd, 4th, and 5th respectively. The subject of his address will be "New Zealand : Its Past History, Present Prosperity, and Future Commercial Importance." The lecture will be illustrated with lantern views.

The Christmas lecture will be delivered by Mr. H. Charles Woods, F.R.G.S., in Aberdeen on the 15th, Edinburgh on the 16th, Glasgow on the 17th, and Dundee on the 18th December. The title of his lecture will be "Travels in the Balkan Peninsula," and it will be illustrated with lantern views.

GEOGRAPHICAL NOTES.

Europe.

The Oil-shale of Raasay and Skye.—We published here on p. 548 a note recording the discovery of oil-shale in the island of Skye. The Director of the Geological Survey of Great Britain communicates to a recent issue of *Nature* an authoritative account of the deposits, written by Dr. C. W. Lee, who made the discovery, and illustrated by the accompanying figures, which we are enabled to reproduce by the kind permission of the editor of *Nature*.

The sketch-map shows the outcrop of the shale in the islands of Raasay and Skye. In Raasay, it will be noted, the bed appears at the surface between Dun Caan and the boundary fault which throws Mesozoic rocks against the Torridonian. The distance between these points is three miles, and the field has an average width of seven-eighths of a mile,

diminishing towards the south. The beds are not folded, and have a dip of about 10 degrees to the west.

In Skye, in the Portree region, a very extensive field once existed now largely destroyed by the contact action of intrusive rocks. The outcrop has been traced from Ollach, five miles south of Portree, to the

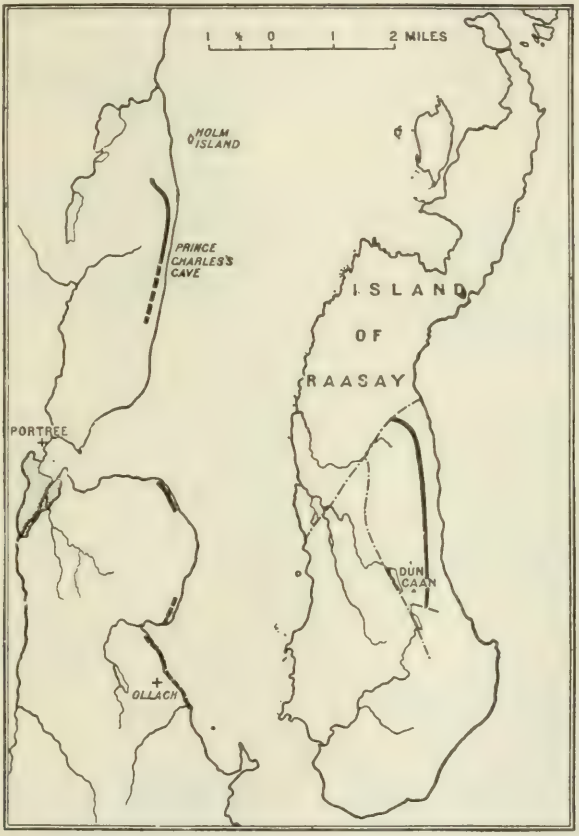


FIG. 1.—Sketch-map showing the outcrop of the Oil Shale in Skye and Raasay.
- - - - - - - Oil Shale, where burnt by contact with igneous rocks.
——— Oil Shale, unaltered by igneous rocks.
—·—·—·— Faults.

Holm burn, five miles north of Portree; but, as the map shows, north of Portree only the part north of Prince Charles's cave has escaped the action of the igneous rocks. South of Portree also, only a small part has escaped alteration. Inland no exposure of the oil-shale horizon has been found, the strata being everywhere covered by higher beds; but, since the dip is low, the shale should be within reach for some distance inland. The oil-shale seam appears to vary in thickness from seven to ten feet. The

analyses so far made have been of weathered portions of the shale, but indicate that the deposit is worth investigation from the commercial point

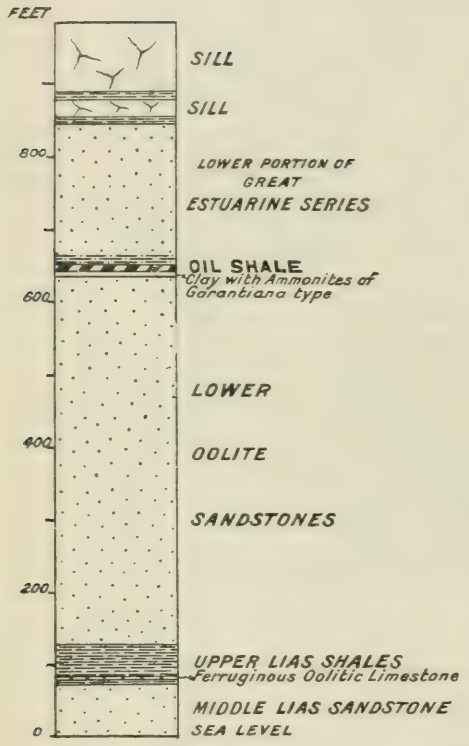


FIG. 2.—Diagrammatic section through the Jurassic beds in the cliff between Hoim and Prince Charles's Cave, Island of Skye, to show the position of the Oil Shale.

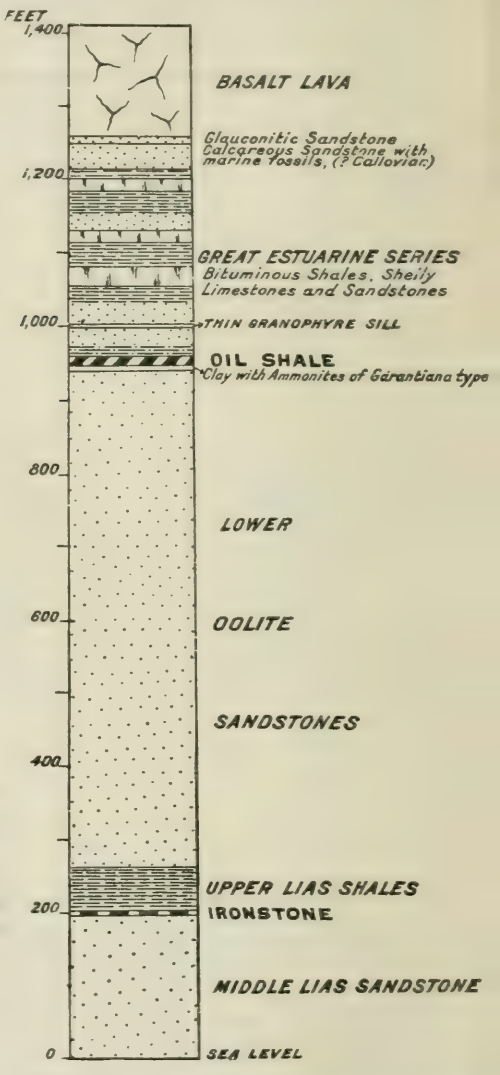


FIG. 3.—Diagrammatic section to show the relations of the Jurassic rocks below Dùn Caan, in the Island of Raasay, and the position of the Oil Shale.

of view. The two diagrammatic sections show the position of the oil-shale beds in the Jurassic beds of Skye and Raasay.

Asia.

Exploration of the Brahmaputra.—Captains Bailey and Morshead have returned to India after an arduous journey of exploration in the Sanpo region. They have proved conclusively that the Sanpo and the Brahmaputra are the same river, but at the same time find that the supposed falls of the Sanpo do not exist. In their journey through the inaccessible Abor country the two officers were without an escort, and were accompanied by ten coolies only. Details in regard to this important journey will be awaited with much interest: it has finally settled one of the most actively debated questions of Asiatic geography.

Africa.

The Climate of the Mariout District.—In connection with the much-debated question of the possibility of notable climatic change occurring within the human period, a paper by Mr. A. L. P. Weedon in *The Cairo Scientific Journal* is of much interest. Mr. Weedon has studied the Mariout district, a strip of land lying west of Alexandria, which in ancient times was famous for its fertility. Now the tract is largely barren and waste, growing only some barley in certain parts. This crop depends upon the winter rains, which are precarious and seem to be about the same in average amount as at Alexandria, *i.e.* about 8·7 inches per annum. The possibility therefore presents itself that the former greater fertility depended upon a greater precipitation. But the rainfall depends upon the temperature of the Mediterranean and the general atmospheric circulation, and Mr. Weedon brings forward evidence which in his opinion shows that neither these nor the rainfall have altered since Roman times. He believes that even at present more profitable crops could be produced by greater skill on the part of the cultivators, and the use of scientific methods in conserving the soil water, or supplying more water.

America.

Forests and Rainfall in the United States.—Dr. Raphael Zon contributes to *Science* of July 18 a long article on the relation of the forests in the Atlantic plain of the United States to the humidity of the central States and the prairie region. The thesis maintained in this article is that forests may exercise a marked effect on the rainfall of distant regions, owing to the fact that winds blowing over a forested area take up more moisture than when blowing over cultivated land, and much more than when blowing over waste land. The thesis involves the assumption that moisture-carrying winds do not, as is usually assumed, take up the greater part of their moisture from the surface of the ocean, but that much is taken up from land surfaces.

Dr. Zon begins by pointing out the special features of the American continent as regards configuration and climate. The fact that the mountain chains run along meridians and not along parallels is of course fundamental, resulting as it does in a free circulation of air over a large

area in latitude. Another peculiar feature is the rapid decrease of temperature from south to north. Thus between Florida and Labrador there is a decrease of temperature in January of 2·9° F. for every degree of latitude, in July of 1·08° F., and for the whole year of 1·7° F. In the same latitudes in Europe the decrease is less than half. Thus between the Canary Islands and northern Scotland the decrease in the mean annual temperature is only 0·8° per degree of latitude.

Again, owing to the position of the mountain chains the whole of the part of the North American continent east of the hundredth meridian forms one climatic province. Throughout this region in winter, and partially in autumn and spring, the prevailing winds are north and north-west, and bring cold dry air from the interior of the continent. When such winds prevail in late spring and summer they are hot and dry. In summer the prevailing winds in Texas are from the south-east, while further north and east they come from the south and south-west. These southerly winds of summer are humid and bring most of the rainfall, and this is especially true of the rainfall of the prairie States and the central region. When southerly winds are frequent during summer these regions produce abundant crops. But seasons of frequent northerly winds are seasons of drought. Dr. Zon is of opinion that the existing forests in the Atlantic plain and Appalachian region help to supply these southerly winds with moisture, and that any destruction of them would diminish the amount of moisture carried to the interior of the continent. He considers therefore that a forest cover should be carefully maintained in the Atlantic plain and the southern Appalachians, especially (1) on moist soils, swamps, which lose water by run-off, being drained to permit of more forest growth; (2) on sandy soils, for otherwise the water percolates to underground channels and thus local surface evaporation is diminished; (3) on steep slopes and rocky places, for here the forest cover prevents rapid run-off and loss of surface water.

Nomenclature of the Amazonian Forest.—Mr. J. C. Branner contributes to *Science* a letter protesting against the common use of the Portuguese word Selva to designate the dense equatorial forest of the Amazon basin. According to him the Brazilians call this, as well as other dense forests, *Mattas*, and Selva is a poetic word infrequently used in Portuguese, and having no special application to the Amazonian forest.

Australasia.

Exploration in Papua.—The Rev. J. Bryant sends us the following note on this subject:—Mr. G. H. Baker, Resident Magistrate of the Western Division of British Papua, has reported on the expedition he recently led into the Fly River districts. He found a considerable portion of the country to consist of swamps, but also a very large area suitable for occupation. The cocoanuts were the finest he had ever seen; tobacco was growing freely; and the sugar cane was excellent.

Mr. Baker selected a spot fifteen miles up the Strickland River as the site for a new control station. The position was suitable in every way except for the crowds of mosquitoes, which on a sunny afternoon were simply maddening.

The expedition started from Daru on June 2nd in two launches and a whale boat. A month was occupied in exploring the Fly and Strickland Rivers. After ascending the Strickland about twenty miles the expedition entered a noble lake. Mr. Baker reports it as the finest he has seen in Papua, and judges its perimeter to be fully one hundred miles. It has been named Lake Murray. The natives proved troublesome and treacherous, and of this stage of the journey he writes:—

"We were inveigled ashore by friendly unarmed natives in canoes, but on landing and proceeding towards the main house, we were surrounded by a host of painted, fully armed warriors, whose intentions were unmistakable. The steadiness of the police, combined with a slow backward movement to the whale-boat, saved the situation.

"On another occasion steaming up the river we ran into the arms of about a hundred and fifty warriors in canoes, fresh from a head-hunting expedition. It required a volley from the police to clear the way. Shortly afterwards we came upon the result of their vile work in the shape of bodies, headless and armless, as well as partly skinned trunks of women, lying on the shore, at what was apparently a peaceful sago-making camp.

"On the way back to the base camp about eight hundred warriors attempted to stop us, but thanks to our powerful glasses the ruse was discovered in time. Two or three unarmed natives stood on the beach and made peaceful signs, while about four hundred warriors with their canoes ready lay hidden in the grass and as many more lay behind the village. As soon as they saw we were going on without taking any notice of them they showed themselves, and the whole place was alive with them. I put a good many miles between us before camping that night."

General.

Pastoral Peoples in Asia and Africa.—Dr. F. Hahn contributes to two recent issues of the *Geographische Zeitschrift* a long article on this subject, in which he attacks vigorously the old theory that hunter, herdsman, and farmer represents three successive stages in human evolution. He says that this exploded theory is not only still current among non-specialists, but is tacitly accepted by those who ought to know better, leads to all sorts of erroneous deductions, and prevents the development of an accurate terminology.

According to him pastoral groups have always been derived from agricultural ones, and are never self-sufficing. Even the Bedouins, he says, do not live upon the produce of their flocks, but by preference consume cereals, coffee, etc., obtained by barter or trade or by stealing. He holds that the Asiatic peoples in the region round Babylon domesticated the ox as a draught animal, and also domesticated sheep and goats. The oxen were more or less tied to the settlements owing to their use in

ploughing, but the sheep and goats were taken by herdsmen afield to feed upon the periodical abundance of the steppe. The herdsmen were thus a part of the agricultural community. The next step, he believes, was the domestication of the ass, which the Asiatics obtained from Africa. The ass was used as a transport animal, and greatly facilitated the movements of the herdsmen. But though used to carry the women and children, the aged and infirm, and also holy men, it was never a riding animal in the strict sense. The horse was in his opinion first used as a draught animal to pull chariots of war, and only later did the pastoral peoples begin to use it as a riding animal. With the acquisition of this habit they acquired great mobility, and the evolution of the warlike hordes of Central Asia was rendered possible.

In Africa, Dr. Hahn believes, the evolution of pastoral peoples took place independently. Cattle were obtained from Asia, and since the negroes do not use the plough, in negro Africa the cow could not acquire there a specially sacred character owing to a connection with agriculture. But he believes that when cattle reached Africa it was with this sacred character already attached, and in his opinion it is impossible to understand the attitude of those negro races who have herds of cattle to their flocks without making allowance for this fact. Cattle in negro Africa are not valued for their usefulness, for sometimes they have little direct use, but because they are the most highly prized possession within reach of the negro, and are comparable to family treasures like linen or silver, often equally unused. Sometimes the negro does not eat the flesh of his herds at all, at other times its use is limited to great occasions, or to the chiefs. Even so purely a pastoral group as the Masai are, he believes, in all probability a recent derivative of an agricultural stock.

The Geographical Society of Lisbon.—We are informed by the President of this Society that it has recently established a Permanent Committee for the protection of the aborigines of the Portuguese Colonies, whose aims are at once to assist the natives and to endeavour to civilise them. This step has been taken on account of the criticism which has been directed against the administration of certain of the colonies, "by those who have forgotten the services to the world rendered by the Portuguese navigators."

Commercial Geography.

Fox-farming in British North America.—A recent article in the *Times* gives an account of a new industry which is apparently becoming of some importance in Prince Edward Island, Newfoundland, Nova Scotia, New Brunswick, and other forested parts of eastern North America. This is the rearing of silver foxes for their coats, which form a costly fur, especially that of the variety called the black fox. The industry has been established in Prince Edward Island on a small scale for about twenty-five years, but it is now spreading and taking a firm hold, especially in Newfoundland where wild foxes are still abundant.

EDUCATIONAL.

Association of Scottish Teachers of Geography.—Mr. T. S. Muir, Hon. Secretary of this Association, furnishes us with the following note :—

"A meeting of the Association was held in the Society's Rooms on Saturday, Nov. 15. The following office-bearers were elected for the year 1913-14 :—*Chairman*, Mr. Geo. G. Chisholm ; *Vice-chairmen*, Mr. Cossar and Mr. Philip ; *Secretary*, Mr. T. S. Muir, Royal High School, Edinburgh ; *Committee*, Messrs. Findlay, Macgregor, Corrie, Millar, and Miss Lennie.

"It was resolved to make up a roll of members and to ask all teachers who are Members or Associates of the Society to intimate to the Secretary whether they wish also to be Members of the Association. Notices of meetings will continue to appear in the *Magazine*, but they will also be sent specially to members of the Association.

"An interesting discussion followed on the Report to the British Association on the teaching of geography in Scotland, an abstract of which appeared in last month's *Magazine*."

We may call attention here to a very fine series of views of Mt. Blanc which appears in the *National Geographic Magazine* for August last. The accompanying article gives some account of the first ascents of Mt. Blanc and also of the conditions under which the climb is made at the present day. The same issue contains a number of striking views of other parts of Switzerland, and also of the Italian lakes.

NEW BOOKS.

EUROPE.

Borrowstounness and District. By Thomas James Salmon. Edinburgh and London : William Hodge and Company, 1913. *Price 6s. net.*

Of late years we have had many monographs dealing with particular counties and places in Scotland, some of them of conspicuous merit. In this volume we have a monograph on Borrowstounness and its vicinity, of which we can say at once that it takes an honourable place among similar works. The author has conscientiously prepared himself for his task by a patient and minute study of the historical and ecclesiastical documents which bear upon it. He has also studied the family histories of the men and women who, connected with Bo'ness, have made their mark in the annals of Scotland. It is very obvious that he suffered at times from an *embarras de richesses* in his materials, and had to condense, and even omit, much matter that would be of great interest to the student of history and of archæology. In these pages we have most interesting and vivid pictures of the appearance and life of the locality from the middle of the sixteenth century, when it emerges into the light of history : trustworthy, because they are vouched for by contemporaneous documents, and lifelike, because Mr. Salmon has most judiciously made no effort to overstate or exaggerate the facts, and has wisely trusted to the intrinsic interest which they are sure to

arouse. He is equally interesting and successful in portraying the crafty and tortuous Hamiltons, and the bigoted but sincere Covenanting ministers. All who are interested in the rise and progress of municipal life and government will find much well worth their study and consideration in the accounts of the various experiments in local self-government in this petty and obscure, but adventurous and stout-hearted village. It is very evident that to Mr. Salmon the preparation of this book has been a labour of love, and he writes with the pardonable enthusiasm and patriotism of one who is justly proud of the place of his birth and its history. We cordially commend this work to our readers.

Handbook of Baltic and White Sea Loading Ports, including Denmark. Revised Edition. By J. F. Myhre. London: William Rider and Son, 1913. *Price* 21*s. net.*

This is the second edition of a useful work of reference, originally published in two parts, but now issued in one volume with the addition of Denmark, which was previously omitted. As well as supplying the practical needs of shipowners and others, the mass of detail contained in it makes the book of importance to the geographer, who will find here facts otherwise not easy to obtain.

Bennett's Handbook for Travellers in Norway. Thirteenth Edition, revised. London: Simpkin, Marshall, Hamilton, Kent and Co., 1913. *Price* 2*s.* 6*d.*

This is a handy little book, published under the auspices of a tourist office in Christiania, and giving practical hints for the traveller in Norway. The route map at the end of the volume does not give much detail, and is similar in type to the maps which usually accompany railway guides.

Sketches of North and West Ireland. By Mary Redsdale Wilson. Illustrated by Jessie S. Wilson. London: Arthur Stockwell, 1913. *Price* 2*s. net.*

A simple little account of wanderings in North and West Ireland, illustrated by a number of pleasing sketches. The text includes notes on the more interesting plants seen in the regions visited.

Mittelmeerbilder. Von Dr. Theobald Fischer. Zweite Auflage besorgt von Dr. Alfred Rühl. Leipzig: B. G. Teubner, 1913. *Price* 7 *marks.*

Before his death Professor Fischer had revised his book to a certain extent, and had prepared various notes and additions. His colleague, Dr. Rühl, was entrusted with the task of preparing the work for the press, and it now appears with a portrait of the late author. The alterations and additions are only of a minor character, the book remaining in essentials the same as before. In its new form it will be welcomed by all those to whom the Mediterranean region makes an appeal.

Spain and Portugal: Handbook for Travellers. By Karl Baedeker. Fourth Edition. London: T. Fisher Unwin, 1913. *Price* 15*s.*

The price of this volume indicates that visitors to Spain and Portugal are not yet large in numbers; and the introduction, which is perhaps needlessly pessimistic in tone, gives incidentally many reasons for this reluctance of the ordinary tourist to venture across the Pyrenees. This is unfortunate, for a glance through the pages of the book shows how much of interest, both to the geographer and the artist, the peninsula contains; and that very indifference to the northerner's point of view, which the book chronicles so often, means that here, far more than in, for

example, Italy, can the traveller come in contact with an unspoilt civilisation differing in many respects from his own, and therefore all the more instructive. We hope that the appearance of this new edition will stimulate interest in the region, and encourage readers to use it, as it is meant to be used, within the country itself.

Naples and Environs: Capri. Grieben's Guide-Books. London: Williams and Norgate, 1913. *Price* 1*s.* 6*d.*

This is another of the handy little Grieben series, containing some useful maps and plans, but no great wealth of detail in the text. The translation is moderately well done. Oddly enough, in a book of German origin, the fact that German is far more commonly spoken round Naples than English is not alluded to.

Photographic Supplement to Stanford's Geological Atlas of Great Britain and Ireland. Arranged and edited by Horace B. Woodward, F.R.S., F.G.S. London: Edward Stanford, 1913. *Price* 4*s. net.*

This little book consists of a fine series of photographs, predominantly of beach and quarry scenes, intended to illustrate the rock features and scenery of the principal formations of Great Britain, and thus to serve as a companion to the *Geological Atlas.* The photographs have been collected from a variety of sources, and we note that the first two reproduced are fine examples from the collection of those taken by the Geological Survey of Scotland. Each figure is described, and references are given to publications where fuller details can be obtained.

The Cathedrals of Southern France. By T. Francis Bumpus. London: T. Werner Laurie, Ltd., 1913. *Price* 6*s. net.*

When a new and restricted definition of geography is pronounced it is possible that architecture will not be included. If so, the exclusion would be regrettable, for architecture reveals in permanent and visible form the ideas of its period, and often it affords a clue to the outside influences at work in the formation of those ideas. At the lowest it indicates the local industries and resources. On these grounds it seems to us that geography should welcome such a scholarly and comprehensive work as this is.

Mr. Bumpus has already published seven volumes on Continental ecclesiology and the latest product of his pen is an epitome of the writings of many authors on a favourite and inexhaustible subject. He does himself some injustice in the title, for his scheme includes not merely Southern, but Central and Western France, including Brittany. An intending visitor to Poitiers for example might not think of consulting this book. Yet the account of the cathedral there is well worth reading. The same may be said of many of the other descriptions, and there is further much information on cognate subjects. The illustrations are numerous and good, and we may instance specially the porch at St. Gilles, where the relief effect is most happily rendered. The index is scarcely as full as we could have wished.

AFRICA.

The Land of Footprints. By Stewart Edward White, F.R.G.S. London: Thomas Nelson and Sons, 1913. *Price* 2*s. net.*

In this volume we have an account of an expedition for big game in East Equatorial Africa. The party, consisting of three American gentlemen and a

lady, had a very good time and bagged plenty of lions, rhinoceros and buffaloes, not to mention smaller game, and they saw some of the now familiar episodes of native life in Uganda. The narrative is very similar to what may be found in a score of books recently published on the same subject, but is pleasantly and crisply written, and will doubtless find acceptance with many readers. Mr. White's experience of the natives with whom he came in contact did not differ much from that of other sportsmen, and there is nothing novel in what he describes. It appears that he is preparing a second volume describing the continuation of the hunting expedition.

Les Sociétés Primitives de l'Afrique Equatoriale. With 9 Figures, 18 Plates, and Map. By Dr. Ad. Cureau. Paris: Armand Colin, 1912. *Price 6 fr.*

The author spent twenty years amongst the natives of the Congo, during which time he travelled from the Atlantic to the Bahr-el-Ghazal. In this book he endeavours to give a sociological and psychological study of the negro race considered as a whole, and traces the evolution of the family, of the village, and of slavery. The village is studied under the following heads: être physique, être vivant, être sensible, être organisé, and être moral. He describes the environment, the overwhelming vegetation of the forest, and the great African rivers with their still smooth surfaces sometimes broken with savage rapids and waterfalls. He lays stress on the effect of the "l'écrasant soleil de midi" with its "impitoyable ardeur" upon the soul of the black man. From these factors of the environment he endeavours to deduce the character of the various natives and their institutions. Naturally, this is a supremely difficult undertaking. The author points out the hopelessness of the negro in face of the exuberance of vegetation, the swarms of insects which make life almost unbearable ("la vraie bête féroce de l'Afrique équatoriale c'est l'insecte"), and the exhaustion due to tropical heat and the effects of disease. Opinions will differ as to whether these feelings, which certainly oppress the European traveller, are experienced with equal force by the negro.

One cannot help sometimes thinking that the author is too didactive in his conclusions, and that he does not fully appreciate other points of view. Thus he hardly refers to the effect of slave-raiding carried on probably for centuries, and to the general insecurity of life and property which has always weighed upon the African negro.

AMERICA.

The Southland of North America. By George Palmer Putnam. New York and London: G. P. Putnam's Sons, The Knickerbocker Press, 1913. *Price* $2.50 *net.*

When in the near future the Panama Canal is opened to the commerce of the world, there is little doubt but that the republics of Central America will require and will receive greater attention than they get now, and for this reason the publication of this volume is opportune and welcome. The author visited half a dozen of these republics in 1912, and he gives us in a pleasant genial way his impressions of their present condition. It has to be admitted at once that, however attractive they are from the beauty of the scenery, the fertility of the soil, their archæological remains, their racial problems, etc., the republics are not, on the whole, very likely to attract many tourists, as they are an outstanding example of how regions, which under good government might vie with any other in the tropics, are paralysed and wellnigh ruined by chronic misgovernment and corruption; much less likely are they to attract commercial enterprise which

would involve the risk of expending capital on their development. So long as the Monroe doctrine holds good and there are no signs of its being abandoned, the only remedy for the misgovernment of these republics would be action on the part of the United States, but this, at least in the meantime, is out of the range of practical politics. The first attempt of the United States to dabble in foreign affairs was far from successful. The writer of this book sums it up as, "Cuba perhaps a failure, and the Philippines a perpetual grief." Moreover, nearer to the United States is the more perplexing problem of Mexico, a country at the present time in a state of revolution. The Mexican question must be settled before the United States can deal with the hornets' nests farther south. Thus, everything seems to indicate that, for some time at least, the central republics will be left to stew in their own juice. The writer of this book seems to have had exceptional facilities for seeing everything that is worth seeing in them, and he relates his impressions in a series of sketches which are amusing and interesting. There are a number of anecdotes and personal adventures and experiences, some of which involved personal danger, and the book is profusely illustrated with good photographs.

Colombia. By Phanor James Eder. London: T. Fisher Unwin, 1913. *Price* 10*s.* 6*d. net.*

This volume is the latest of Mr. Fisher Unwin's excellent South American series, and Mr. Eder, who by birth, friendships and business relations with the country is well qualified for his task, endeavours to present a "true, fair and sympathetic picture of present-day commercial and industrial conditions in Colombia." A glance at the map will show that the chief geographical feature of Colombia is its great Andean mountain system, forming the three "cordilleras" or main ranges of the Western, Central, and Eastern Cordilleras. Of the three, the central Cordillera is the most important, constituting the backbone of the country, while the table-land of Bogotá forms the heart of the central zone. Here, at an elevation of from 7000 to 8000 feet, an equable climate prevails, and the conditions are more favourable to civilised life than in the low belts by the river valleys and on the sea coasts. Boundary questions are the most fruitful source of trouble between Colombia and its neighbouring states, the frontiers not having been delimited towards Ecuador, Venezuela, and Peru, although the limits with Brazil on the west are now defined under a recent treaty. Fears of aggression on the part of the United States are the dominant note in a movement towards an alliance among the Spanish-American countries, and no one can say that such fears are devoid of foundation when one remembers the ruthless seizure of the department of Panama by President Roosevelt as a canal zone. As Mr. Eder puts it, "the Colombians have already felt the talons of the Eagle: they have a hysterical dread that the voracious bird will again swoop down upon their country. Hysterical is the only word. Suspicion of the designs of the American Government is carried to an absurd limit." This admission is the more significant coming from a citizen of the United States.

Mr. Eder deals mainly with the industrial and financial conditions of Colombia, and this aspect is of especial interest in view of the large concessions recently granted to a British firm, or syndicate, but there is much in the book which cannot fail to be of interest to all who are attracted by the boundless possibilities of a rich but imperfectly developed state. The author's opinion is that the railway building which has been attempted, at present resulting in only six hundred miles of "provisional tracks," will have to be done over again, the

sooner the better; and that, consequently, "the country offers an almost virgin field for the railway operator and financier." Concessions are likely to be the order of the day, as Colombia itself cannot find the necessary capital, and, if nothing untoward happens, British engineers and others will find an outlet for their energies in the near future. The sections of the book which deal with Commerce, Agriculture, Mines and Forests contain some valuable hints.

Mr. Eder has eliminated the personal incidents of travel which speak home to the general reader, but he finds space for one picture of the inns on the Quindo road, between the Cauca and Magdalena valleys, which shows what the traveller may have to put up with. However, there are many compensations to be found in the fine air and magnificent scenery of the Andean Uplands. A curious point is that the little group of islands off the Colombian coast known as San André and Providencia, are populated by blacks and mulattoes who are English-speaking, and mainly Protestant, though belonging to a Spanish State.

A bibliography and a large and clear map help to make this an excellent book of reference on matters Colombian, which we can confidently recommend to our readers.

Twentieth-Century Jamaica. By H. G. De Lisser. Kingston: *The Jamaica Times*, 1913.

This unpretending little book gives an account of the social, economic, and political conditions which exist in Jamaica at the present time. The introductory chapter, which deals with Jamaica's future, discusses the three possibilities before the island—that it should remain attached to the mother country as at present, that it should be taken over by Canada or by the United States. The author seems to consider that the balance of probabilities lies in the last-named direction. Thus he points out that in 1911 the United States purchased Jamaica's products to the value of £1,825,000, the United Kingdom to £438,000 only, and Canada to the value of £253,000. Thus whatever Canada may be in a position to do in the future, at present as a purchaser of Jamaican products she is almost negligible. The banana trade, now the most important in the island, is in American hands, and the Americans are introducing improved business methods in connection with the export of other Jamaican products also. In the supply of manufactured goods the United Kingdom and the United States bulk almost equally (United Kingdom, £1,291,000; United States, £1,200,000), but the imports from Canada just about balance the exports.

Very interesting also is the account of the evolution of a distinctively Jamaican type, in which colour counts for very little, and of the growing dissatisfaction of the people with the present mode of government. The book is soberly written, and is well worth the attention of the geographer.

POLAR.

Le Monde Polaire, par Otto Nordenskjöld. Traduit du Suédois par Georges Parmentier et Maurice Zimmermann. Paris: Librairie Armand Colin, 1913. *Prix* 5 *fr.*

In this volume we have a translation in French of an exceedingly interesting work on the Polar world by Professor Otto Nordenskjöld. The writer deals with his subject mainly from a geological point of view, but he has added much valuable information and speculation as to the origin and distribution of the inhabitants of the Arctic circle. The subject is a large one, and considera-

tions of space have compelled Dr. Nordenskjöld to condense ruthlessly, and as a result we have what may be described as a series of sketches or essays, no one of which is the last word that is to be said on its subject-matter. Indeed, a perusal of this book impresses the reader with the feeling that even now comparatively little is known of the conditions of the Polar world, and that its former history is still a matter of doubt and conjecture. This is mainly the result of the modesty of the writer, who, although an acknowledged authority and expert, carefully refrains from dogmatising, but advances his theories and states his opinions and conclusions with great caution, and is the first to admit that we have much to learn yet about the Polar world. As a summary of what is known of the geological conditions of the Arctic and Antarctic regions this work is excellent, and it also points out the directions in which further investigation is necessary.

GENERAL.

Animal Geography. By Marion I. Newbigin, D.Sc. Oxford: The Clarendon Press, 1913. *Price* 4*s.* 6*d.*

We welcome the appearance of this useful study of "the faunas of the natural regions of the globe." The complaint in the Preface that the relationship existing between fauna and natural environment has not been given its due share of treatment in modern text-books of geography is, we think, well founded, but Miss Newbigin's book has removed the reproach.

The natural regions chosen are distinctly phytogeographical, for, as the introductory chapter points out, "all animals depend ultimately for their food upon plants." Following upon a general discussion of the natural regions come detailed accounts of these—their physical and climatic conditions and the animals living under the conditions. In our opinion, chapter i., The Tundra and its Fauna; chapter iii., Steppe Faunas; chapter vi., Tropical Savanas and Deserts; and chapter viii., The Distribution of Animal Life in the Sea, are most valuable. If one single chapter can be singled out as specially geographical, it is the last mentioned. A general sketch of the recognised zoo-geographical regions occupies chapter ix., while an outline classification of animals is given as an Appendix.

A distinguishing feature is the excellent plan of giving lists of references at the close of the various chapters. For those who wish to pursue the study further, the lists will serve as guide-posts. Close on fifty well-chosen illustrations enhance the value of the book, which altogether is a credit to both writer and publishers.

Making the most of the Land. By James Long. London, New York, Toronto: Hodder and Stoughton, 1913. *Price* 5*s. net.*

This work, the production of a well-known authority on agriculture, does not lend itself very readily to notice in the pages of this magazine. It is frankly political. It deals with the important but highly controversial subject of how to make the most of the agricultural land of Great Britain, and the writer in no way conceals his approval of the policy of practically unlimited creation of small holdings and of a new system of rating, which would press heavily on owners of uncultivated land. He treats his subject with much knowledge, experience and study, and under these circumstances his views, supported as they are by wealth of statistics and illustrations taken from home and foreign sources, are well worth serious attention, however unpalatable they may be found by many.

A perusal of the book will open the eyes of many to the present serious condition of British agriculture in its continual and severe competition with foreign nations, and may convince some that the greatest hindrance to agricultural success in these islands is the dogged conservatism and invincible obstinacy of the average farmer.

The "Welcome": Photographic Exposure Record and Diary, 1914. London: Borroughs, Wellcome and Co. *Price* 1*s.*

This useful little pocket-book appears as usual with great promptness, and we note as special features of the present issue that it contains reproductions of photographs taken by the Scott Expedition, and also a striking war-plane view of the river Maritza. The book does not now require recommendation to the amateur photographer, to whom its merits are well known.

"The Car" Road-Book and Guide. An Encyclopædia of Motoring. Edited and revised by Lord Montagu. London: *The Car Illustrated*, Ltd., 1913. *Price* 12*s.* 6*d. net.*

We have already reviewed here an earlier edition of this useful compilation with its excellent map. The present issue has been brought up to date, but shows no very novel features.

"The Britannica" Year-Book, 1913. A Survey of the World's Progress since the completion in 1910 of the *Encyclopædia Britannica*, eleventh edition. Edited by Hugh Chisholm. London: The *Encyclopædia Britannica* Co., 1913. *Price* 10*s.*

This is a year-book of a somewhat new type, whose scope is sufficiently indicated by the title. It contains in a convenient form many facts of great importance to the geographer.

Bradshaw's Through Routes to the Chief Cities, Bathing and Health Resorts of the World. Edited by Eustace Reynolds Bell. London: Henry Blacklock and Co., 1913. *Price* 6*s. net.*

The present edition of this book has been revised and enlarged, and gives in a compact form a great mass of information for the intending traveller. In addition to the traveller, however, the teacher will find many little facts and details which will help to give reality to his lessons. There are a number of useful maps, plans, and charts.

EDUCATIONAL.

Dent's Practical Notebooks of Regional Geography. By Horace Piggott and Robert Finch. Book i. The Americas; ii. Asia; iii. Africa; iv. The British Empire in America and Asia. London: Dent and Sons, 1913. *Price* 6*d. net each.*

These notebooks contain a series of blank maps, etc., facing pages intended for notes, each map having a list of instructions giving the exercises for which it can be used. The actual facts required are intended to be sought for in an atlas or geography book. Most of the ruled sheets intended for graphs seem to us very trying for the eyes, the ruling being in black and the squares small, but the exercises on the map should prove of great use if carried out carefully.

Questions and Exercises in Geography. By R. J. Finch, F.R.G.S. London: Ralph Holland and Co., 1913. *Price* 2*s.* 6*d. net.*

To the busy teacher this must prove a most valuable source for obtaining examination questions. The wise selection, careful arrangement, and skilful grading should do much to make for the author's aim, "to fit the student for dealing with geographical problems in the examination room." By no means the least valuable portion of the book is the able introduction where typical answers are given to typical questions. Especially useful is the figure showing the geographical significance of the site of Buda-Pesth.

A Comparative Geography of the Six Continents. By Ellis W. Heaton, B.Sc., F.G.S. London: Ralph Holland and Co., 1913. *Price* 1*s.* 9*d. net.*

Mr. Heaton's "Scientific Geographies" are already well known to and much appreciated by teachers, but it is doubtful whether he has yet done anything more strictly geographical on comparative lines than the little work before us. Environmental, more especially climatic, conditions are never lost sight of, and the book has a great deal to say which is most suggestive. Several of the diagrams must prove very useful; we refer especially to figs. 12, 13, 14, 15, 16a, 16b, 27, 34, 58, 60, 61, 62, 66, 67, and 68. A new feature in Mr. Heaton's books is the insertion of photographic illustrations.

The British Empire with its World Setting. By J. B. Reynolds, B.A. London: A. and C. Black, 1913. *Price* 1*s.* 4*d.*

For the needs of the pupils for which this book is specially written, viz., those of "the upper classes of elementary schools," the little work by Miss Reynolds is eminently suitable. Its neat appearance, clear print, and well-selected illustrations must make this Junior Regional Geography pleasing to the pupils. The "Questions and Suggestions" at the end of the sections are useful, and the material of the text is well arranged and happily chosen.

BOOKS RECEIVED.

Lands and their Stories: Asia, Africa, and America, outside the British Empire. By A. W. Palmer. With Appendices by David Frew, B.A. Crown 8vo. Pp. 304. *Price* 1*s.* 9*d.* Blackie and Son, Ltd., 1913.

Camping in Crete, with Notes upon the Animal and Plant Life of the Island. By Aubyn Trevor-Battye, M.A., F.L.S., F.Z.S., F.R.G.S., etc. Including a Description of certain Caves and their Ancient Deposits. By Dorothea M. A. Bate, M.B.O.U. With 32 Plates and a Map. Demy 8vo. Pp. xxi + 308. *Price* 10*s.* 6*d. net.* London: Witherby and Co., 1913.

Ten Years near the Arctic Circle. By J. J. Armistead. Crown 8vo. Pp. 252. *Price* 3*s.* 6*d. net.* London: Headley Brothers, 1913.

My Somali Book: A Record of Two Shooting Trips. By Captain A. H. E. Mosse, F.Z.S. Illustrated with Photographs by the Author, and with Sketches and Cover Design by Lieut. D. D. Haskard, R.A. With an Introduction by Colonel H. G. C. Swayne, R.E., F.Z.S. Demy 8vo. Pp. xxv + 314. *Price* 12*s.* 6*d. net.* London: Sampson Low, Marston and Co., Ltd., 1913.

Principles and Methods of Teaching Geography. By Frederick L. Holtz, A.M. Crown 8vo. Pp. xii + 359. *Price* 5*s. net.* New York: The Macmillan Co., 1913.

Dix mille Kilomètres à travers Le Mexique, 1909-1910. Par Vitold de

Szyszlo. Avec 22 gravures hors texte. Crown 8vo. Pp. iv + 343. *Prix* 4 *francs.* Paris: Plon-Nourrit et Cie, 1913.

Mountains: Their Origin, Growth and Decay. By James Geikie, LL.D., D.C.L., F.R.S. (L. and E). Demy 8vo. Pp. xix + 311. *Price* 12*s.* 6*d. net.* Edinburgh: Oliver and Boyd, 1913.

A Text-Book of Geography. By A. W. Andrews, F.R.G.S., F.R.S.G.S. Illustrated. Crown 8vo. Pp. xii + 655. *Price* 5*s.* London: Edward Arnold, 1913.

History of Geography. By J. Scott Keltie, LL.D. and O. J. R. Howarth, M.A. Crown 8vo. Pp. ix + 154. *Price* 1*s. net.* London: Watts and Co., 1913.

Die Sorge-Bai: Aus den Schicksalstagen der Schröder-Stranz Expedition. Von Dr. Hermann Rüdiger. Mit 46 Bildern im Text und 5 Tafeln nach Zeichnungen u. photographischen Aufnahmen des Marinemalers Christopher Rave, sowie einer Übersichtskarte. Medium 8vo. Pp. xii + 215. *Preis* 5 *Marks.* Berlin: Georg Reimer, 1913.

Things Seen in Oxford. By Norman J. Davidson, B.A. (Oxon). With 50 Illustrations. Foolscap 8vo. Pp. xv + 258. *Price* 2*s. net.* London: Seeley, Service and Co., Ltd., 1913.

Winning a Primitive People: Sixteen Years' Work among the Warlike Tribe of the Ngoni and the Senga and Tumbuka Peoples of Central Africa. By Donald Fraser. With an Introduction by John R. Mott, LL.D., F.R.G.S. With 27 Illustrations and 2 Maps. Crown 8vo. Pp. 320. *Price* 5*s. net.* London: Seeley, Service and Co., Ltd., 1913.

A Church in the Wilds: The Remarkable Story of the Establishment of the South American Mission amongst the hitherto Savage and Intractable Natives of the Paraguayan Chaco. By W. Barbrooke Grubb. Edited by H. T. Morrey Jones, M.A. (Oxon.). With 23 Illustrations and 2 Maps. Crown 8vo. Pp. xv + 287. *Price* 5*s.* London: Seeley, Service and Co., Ltd., 1913.

Through the Heart of Canada. By Frank Yeigh. With 38 Illustrations. Demy 8vo. Pp. 319. *Price* 5*s.* London: T. Fisher Unwin, 1913.

Chambers's Commercial Handbooks: Commercial Geography of the World. Part II.: *Outside the British Isles.* By A. J. Herbertson, M.A., Ph.D. Revised by James Cossar, M.A. Second Edition. Crown 8vo. Pp. 383. *Price* 2*s.* 6*d.* London: W. and R. Chambers, Ltd., 1913.

Northumberland: Yesterday and To-day. By Jean F. Terry, LL.A. Crown 8vo. Pp. 235. *Price* 1*s.* 6*d. net.* Newcastle-upon-Tyne: A. Reid and Co., Ltd., 1913.

To Norway and the North Cape in "Blue Dragon II.," 1911-12. By C. C. Lynam, M.A. Illustrated in Colour, and with Photograph Sketches and Maps. Medium 8vo. Pp. xxiv + 232. *Price* 6*s. net.* London: Sidgwick and Jackson, Ltd., 1913.

Il Genere umano morirà di Fame? By Gustavo Coen. Crown 8vo. Pp. 132. Livorno: S. Belforte e Ci.

The Ocean: A General Account of the Science of the Sea. By Sir John Murray, K.C.B., F.R.S., LL.D., D.Sc., Ph.D. Foolscap 8vo. Pp. 256. *Price* 1*s. net.* London: Williams and Norgate, 1913.

The Humour and Pathos of the Australian Desert. By John Beukers. Crown 8vo. Pp. 249. *Price* 4*s. net.* London: A. H. Stockwell, 1913.

The Conquest of the Desert. By Wm. Macdonald, M.S. Agr., Sc.D., Ph.D., D.Sc. With 50 Illustrations. Demy 8vo. Pp. xii + 197. *Price* 7*s.* 6*d. net.* London: T. Werner Laurie, Ltd., 1913.

An Artist in Italy. By Walter Tyndale, R.I. Royal 4to. Pp. 307. *Price* 20*s. net.* London: Hodder and Stoughton, 1913.

Islands grösster Vulkan: Die Dyngjufjöll mit der Askja. Von Dr. Hans Spethmann. Mit 36 Abbildungen im Text. Demy 8vo. Pp. vii + 143. *Preis* 6 *Marks.* Leipzig: Veit and Co., 1913.

Two Years with the Natives in the Western Pacific. By Dr. Felix Speiser. Demy 8vo. Pp. xii + 291. *Price* 10*s.* 6*d. net.* London: Mills and Boon, Ltd., 1913.

Au Yunnan et dans le Massif du Kin-Ho (Fleuve d'Or). Par le Dr. A. F. Legendre. Avec 20 gravures et une carte. Crown 8vo. Pp. xii + 434. Paris: Plon Nourrit et Cie, 1913.

Guatemala and the States of Central America. By Charles W. Domville-Fife. Illustrated. Demy 8vo. Pp. 310. *Price* 12*s.* 6*d. net.* London: Francis Griffiths, 1913.

La Bolivie et ses Mines. Par Paul Walle. Soixante et une Illustrations hors texte et quatre Cartes. Demy 8vo. Pp. xvi + 444. *Prix* 7 *francs* 50. Paris: E. Guilmoto, 1913.

Across Unknown South America. By A. Henry Savage-Landor. With 2 Maps, 8 Coloured Plates and 260 Illustrations from Photographs by the Author. In 2 Vols. Pp. xxiv + 432 and xvi + 504. Medium 8vo. *Price* 30*s. net.* London: Hodder and Stoughton, 1913.

Scott's Last Expedition. In 2 Volumes. Vol. I. Being the Journals of Captain R. F. Scott, R.N., C.V.O. Vol. II. Being the Reports of the Journeys and the Scientific Work undertaken by Dr. E. A. Wilson and the Surviving Members of the Expedition. Arranged by Leonard Huxley. With a preface by Sir Clements R. Markham, K.C.B., F.R.S. Illustrated. Demy 8vo. Pp. I. xxvi + 633; II. xiv + 524. *Price* 42*s. net.* London: Smith, Elder and Co., 1913.

The Waters of the North Eastern North Atlantic: Investigations made during the Cruise of the "Frithjof," of the Norwegian Royal Navy in July 1910. By Fridtjof Nansen. With 52 Text-Figures and 17 Plates. Medium 8vo. Pp. 139. Leipzig: Dr. Werner Klinkhardt, 1913.

A Report on the Land Settlement of the Gezina (*Mesellemia District*). By H. St. G. Peacock, Esq. Royal 8vo. Pp. 68. London: Sifton Praed and Co., Ltd., 1913.

Memoirs of the Geological Survey, Scotland: The Geology of the Fannich Mountains and the Country around Upper Loch Maree and Strath Broom. (Explanation of Sheet 92.) By B. N. Peach, LL.D., F.R.S.; J. Horne, LL.D., F.R.S.; the late W. Gunn; C. T. Clough, M.A., F.G.S., and E. Greenly, F.G.S. *Price* 2*s.* 6*d.* Edinburgh, 1913.

Diplomatic and Consular Reports. Trade, etc., of the Portuguese Possessions in East Africa, 1912 (5210); Trade of Casablanca, 1912 (5217); Trade of Milan, 1912 (5218); Foreign Trade of Italy, 1912 (5219); Finances of Greece, 1912-13 (5224); Foreign Commerce of Russia and Trade of the Consular District of St. Petersburg, 1912 (5197); Trade, etc., of Denmark, 1912 (5221); Trade, etc., of Düsseldorf, 1912 (5222); Commerce and Industry of the Atlantic Coast of Honduras, 1912 (5215); Trade of Tsinan and Tsingtau, 1912 (5223).

Colonial Reports (*Annual*).—Basutoland, 1912-13 (769); Gold Coast, 1912 (770); Nyasaland, 1912-13 (772).

Diplomatic and Consular Reports Miscellaneous. Report on the Supply of Electricity in Germany by the chief works in which private concerns and public bodies are jointly interested (685).

Publishers forwarding books for review will greatly oblige by marking the price *in clear figures, especially in the case of foreign books.*

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

REPORT OF COUNCIL.

Twenty-Ninth Session, 1912-1913.

The Council has the honour to submit the following Report :—

Ordinary Membership.

The changes which occurred during the Session in the number of members were as follows :—

Number on 1st October 1912,		1898
New Members added,		50
		1948
Deduct by Death,	54	
„ Resignation,	147	
„ Arrears,	20	
		221
Number of ordinary members remaining on roll on 30th September 1913,		1727

Of this number, 920 are on the Edinburgh list, 422 are on the Glasgow list, 149 and 113 on the Dundee and Aberdeen lists respectively. In addition to those on the lists named, 35 members reside abroad, and 88 reside in England. The number of life members in the total given above is 222.

Teacher Associate Members.

Number on 1st October 1912,		166
New Members added,		34
		200
Deduct by Death,	1	
„ Resignation,	36	
		37
Number of Teacher Associates remaining on roll on 30th September 1913,		163

Corresponding Members.

The corresponding members number forty-six.

Meetings of the Society.

The Society's Anniversary Meeting was addressed by Captain Roald Amundsen. Thirty-one ordinary meetings were held, seven in Edinburgh and eight in Glasgow, Dundee, Aberdeen. These meetings were addressed by Miss Ellen Churchill Semple ; the Hon. Sir Newton J. Moore, K.C.M.G., J.P., M.L.A. ; Captain Ejnar Mikkelsen ; Mr. A. Bentinck, F.R.G.S. ; Mr. F. Kingdon Ward, F.R.G.S. ; Prof. J. Norman Collie ; Prof. D'Arcy Thompson, C.B. ; Sir Harry Johnston, G.C.M.G., K.C.B. ; Mr. Harry de Windt, F.R.G.S. ; Mrs. Mary Gaunt ; Dr. Grieve ; and Mr. Geo. G. Chisholm, M.A., B.Sc.

Medals Awarded.

The Livingstone Gold Medal was conferred on Captain Roald Amundsen for his valuable geographical discoveries in connection with his recent expedition to the South Pole.

The Society's Silver Medal was awarded to Captain Ejnar Mikkelsen for his explorations in North-Eastern Greenland.

The Silver Medal offered by the Society in connection with the Lectureship in Geography at Edinburgh University was awarded to Mr. Laurance J. Saunders for his essay entitled "A Geographical Description of Fife, Kinross, and Clackmannan."

The Late Colonel Bailey, R.E.

The Council have to express their regret at the loss which the Society has sustained through the death of Colonel Bailey, a minute with regard to which has already been published in the *Magazine* (p. 153).

The Disaster to Captain Scott's Antarctic Expedition.

On the instruction of the Council the Secretary of the Royal Scottish Geographical Society sent a message of condolence, which has already been published in the *Magazine* (p. 154), to Lady Scott.

Gaelic Place-Names.

A request having been received from the Director-General of the Ordnance Survey asking for the co-operation of the Society in the settling of queries in the spelling of Gaelic Place-Names in Scotland, the Council decided to revive the place-names committee. The committee is not confined to members of the Society, and has Dr. John Watson, Rector of the Royal High School, as chairman, the convener being Mr. John Mathieson. The committee have also secured the services of gentlemen as corresponding members in the counties of Argyll, Aberdeen, Inverness, Perth, Ross and Sutherland. Six meetings have been held since their appointment in March last, and over forty cases have been submitted to them for their opinion.

Recently the Survey authorities submitted to them for criticism a glossary of Gaelic and corrupt forms of Gaelic and Norse words, which is to appear in the pocket editions of the Ordnance Survey maps, and the Director-General of the Survey has thanked them for their assistance. The committee received considerable assistance from the publication in the *Magazine* of their letter in June last, and they have now issued forms for the use of correspondents.

Livingstone Centenary.

Meetings commemorative of the centenary of the birth of Dr. David Livingstone were held by the Society in Edinburgh and Glasgow. Sir Harry Johnston, G.C.M.G., K.C.B., addressed the meetings.

Bust of Dr. Livingstone.

Captain Livingtone Bruce has very kindly lent to the Society a marble bust of his grandfather, Dr. David Livingstone.

Association of Scottish Teachers of Geography.

The Association of Teachers of Geography in Scotland, under the auspices of the Society, has held several meetings, and although so far small in numbers it promises to perform useful work. It has been the means of attracting additional teacher associates to the Society, and as the Association becomes better known it will probably continue to do so more largely, besides securing members of the

Association outside the Society. There is some prospect of a branch being started in Aberdeen. The Association has made a beginning with discussing the scope of geography in the elementary and supplementary classes in schools, and it is hoped that this side of the Association's work will be further developed next session.

Diploma of Fellowship.

There are at present six Honorary Members, forty-seven Honorary Fellows, and one hundred and six Ordinary Fellows of the Society.

During the session the ordinary Diploma of Fellowship was awarded to the Rev. S. B. Rohold, Toronto.

The Society's Magazine.

The *Scottish Geographical Magazine* has, as usual, been published throughout the past session monthly, with maps and illustrations.

The Council is glad to acknowledge its obligations to the contributors of articles, and to the following gentlemen who have rendered valuable assistance to the editors:—Dr. J. G. Bartholomew; Mr. E. S. Bates; Dr. R. N. Rudmose Brown; Dr. W. S. Bruce; Mr. H. M. Cadell; Mr. Geo. G. Chisholm; Dr. A. S. Cumming; Rev. A. K. Dallas; Mr. G. F. Scott Elliot; Mr. H. B. Finlay; Prof. J. W. Gregory; Sir Philip Hamilton Grierson; Mr. N. Miller Johnston; Mr. W. R. Kermack; Rev. R. Mackenzie; Mr. J. Mathieson; Mr. J. D. Monro; Mr. T. S. Muir; Mr. J. Murray; Mr. H. J. Peddie; Mr. D. Pryde; Mr. Ralph Richardson; Mr. Andrew Watt; Mr. R. Wilkie; Mr. W. B. Wilson.

Library and Map Department.

During the past session 393 books, 57 pamphlets, 402 reports, 9 atlases, 394 map-sheets and charts have been added to the library. The Transactions and periodicals received regularly number 175. The number of volumes borrowed by members was 4262, and the library was, as usual, much consulted by non-members in search of geographical information.

The Council desires to record its thanks to foreign and colonial governments for the official publications they have presented to the library; to the Treasury, for the revised Ordnance Survey Maps of Scotland, both in outline and colour, as each of the revisions now in progress is published; to the Geological Survey of Scotland; to the Geographical Section, General Staff, War Office; to the Admiralty; to the British Museum (Natural History), the Edinburgh University Library, the Royal Society of Edinburgh, and the Survey of India; and also to the undermentioned private donors of books and maps, viz.:— H.R.H. The Duke of the Abruzzi; Dr. J. G. Bartholomew; Mr. Charles Boog-Watson; Dr. W. S. Bruce; Mr. J. Y. Buchanan, M.A.; Dr. James Burgess, C.I.E.; Mr. W. Caldwell Crawford; Dr. Jean Charcot; Mr. C. B. Crampton, M.B., C.M.; Mr. G. F. Scott Elliot; Sir Sven Hedin, K.C.I.E., LL.D.; Mr. Henri A. Junod; Mr. John Menzies; Captain Ejnar Mikkelsen; Prof. E. Oberhummer; Dr. Albrecht Penck; Major-General J. de Schokalsky; Mr. Lewis Spence; Mr. W. Stevenson; Mr. J. B. Tyrrell, F.G.S.; and Prof. Eug. Warming.

Glasgow, Dundee, and Aberdeen Centres.

The Council has again pleasure in acknowledging the services rendered by the honorary officials of the Glasgow, Dundee, and Aberdeen centres for their continued successful conduct of the business of the Society.

Finance.

The Council begs to submit the Annual Financial Statement.

ABSTRACT OF THE ACCOUNTS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

From 1st October 1912 to 30th September 1913.

FUNDS AT THE CLOSE OF LAST ACCOUNT:—			
£1000 Glasgow and South-Western Railway Company 4 per cent. Debenture Stock, at cost price, as at 29th May 1885,		£1102 19 9	
£533, 6s. 8d. North British Railway Company 3 per cent. Consolidated Lien Stock, at cost price, as at 30th December 1890,		496 2 0	
£200 Great Central Railway Company 4½ per cent. Debenture Stock, at cost price, as at 31st December 1898,		312 2 9	
£240 North British Railway Company 4 per cent. Consolidated Preference Stock, No. 1, at cost price, as at 11th December 1902,		306 8 9	
£400 Dominion of Canada 3½ per cent. Registered Stock, 1930-50, at cost price, as at 9th March 1911,		405 1 0	
		£2622 14 3	
BALANCE due by Banks:—			
On Account Current,	£83 7 10		
On Deposit Receipt,	301 19 5		
On Do. do. (Glasgow Equipment Fund)	63 8 8		
Due by Treasurer,	4 3 9		
		455 19 8	
		£3078 13 11	
Less—Subscriptions received applicable to Sessions 1912-13 and 1913-14,		12 12 0	
		£3066 1 11	
SUBSCRIPTIONS from Ordinary Members,	£1694 14 0		
Less—Paid in Advance,	18 18 0		
	£1675 16 0		
SUBSCRIPTIONS from Associate Members,	£91 7 0		
Less—Paid in Advance,	0 10 6		
	90 16 6		
FEES received for Society's Diploma,	3 3 0		
DIVIDENDS and INTERESTS,	110 0 4		
GOVERNMENT GRANT,	200 0 0		
MISCELLANEOUS,	5 0 8		
ENTRANCE FEES from new Members,	£33 1 6		
Less—Paid in Advance,	2 12 6		
	30 9 0		
		2115 5 6	
		£5181 7 5	

MAGAZINE—Expenses of Publication, etc., for Nos. 10 to 12 of Vol. XXVIII., and Nos. 1 to 9 of Vol. XXIX.:—			
Printing and other charges,		£614 1 0	
Illustrations,		42 19 2	
Maps,		17 8 1	
		£674 8 3	
Less—Magazines sold,	£70 8 2		
Advertising Receipts, less Payments,	77 18 2		
		148 6 4	
		£526 1 11	
GENERAL PRINTING,		24 2 0	
BOOKS and other furnishings for Library,		43 17 0	
EXPENSES in connection with Lectures—*Less* Lecture Tickets sold,		541 2 7	
GLASGOW BRANCH, Rent of Room,		15 0 0	
RENT OF COUNCIL ROOM, Taxes, Gas, Repairs, Insurance, etc.,		232 19 1	
SALARIES,		572 9 2	
MISCELLANEOUS, including Stationery, General Expenses, and Postages,		101 1 8	
MEDALS,		3 4 0	
		£2059 17 5	
FUNDS AT THE CLOSE OF THIS ACCOUNT:—			
£1000 Glasgow and South-Western Railway Company 4 per cent. Debenture Stock at cost price, as at 29th May 1885,	£1102 19 9		
£533, 6s. 8d. North British Railway Company 3 per cent. Consolidated Lien Stock, at cost price, as at 30th December 1890,	496 2 0		
£200 Great Central Railway Co. 4½ per cent. Debenture Stock, at cost price, as at 31st December 1898,	312 2 9		
£240 North British Railway Company 4 per cent. Consolidated Preference Stock, No. 1, at cost price, as at 11th December 1902,	306 8 9		
£400 Dominion of Canada 3½ per cent. Registered Stock, 1930-50, at cost price, as at 9th March 1911,	405 1 0		
	£2622 14 3		
BALANCE due by Banks:—			
On Account Current,	£49 0 4		
On Deposit Receipt,	404 19 5		
On do. do. (Glasg. Equipment Fund),	63 8 8		
DUE by Treasurer,	3 8 4		
	520 16 9		
	£3143 11 0		
Less—Subscriptions received in advance:—			
Ordinary Members,	£18 18 0		
Associate Members,	0 10 6		
Entrance Fees,	2 12 6		
	22 1 0		
		3121 10 0	
		£5181 7 5	

Edinburgh, 21st October 1913.—I have examined the Accounts of the Royal Scottish Geographical Society for the year ended 30th September 1913, of which the above is an Abstract, and compared them with the Vouchers and Instructions thereof, and I find the whole to be correctly stated and sufficiently vouched and instructed.

P. C. ROBERTSON, M.A., C.A., Auditor.

LIVINGSTONE MEDAL FUND.

FUNDS AT THE CLOSE OF LAST ACCOUNT:—		
£770 North British Railway Company 4 per cent. Preference Stock No. 1, at cost price,	£999 11 6	
Deposit Receipt,	50 13 5	
		£1050 4 11
INCOME RECEIVED—		
Dividend on £770 North British Railway Company 4 per cent. Preference Stock No. 1— From 31st January 1912 to 30th June 1913,	41 1 4	
Bank Interest,	1 12 3	
Income-tax recovered,	1 13 2	
		£1094 11 8

Paid Messrs. Alexander Kirkwood & Sons for Medal,		£30 0 0
FUNDS AT THE CLOSE OF THIS ACCOUNT—		
£770 North British Railway Company 4 per cent. Preference Stock No. 1, at cost price,	£999 11 6	
Deposit Receipts,	65 0 2	
		1064 11 8
		£1094 11 8

Edinburgh, 21st October 1913.—Examined and found correct.

P. C. ROBERTSON, M.A., C.A., Auditor.

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